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Research Report 1836

Developing an Environment for Exploring Distributed Operations: A Wargaming Example

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Requirements for Future Force operations indicate that planning and wargaming must transition from a collocated, sequential, and staff-centered process to one that is distributed, simultaneous, and commander-centered. The present research developed a course of action analysis (wargaming) environment for exploring the human performance requirements associated with distributed wargaming activities characteristic of Future Force operations. This report describes the design, development, and initial evaluation of the multi-echelon distributed wargaming exercises and simulation tools comprising the wargaming research environment. Key design features of the research environment are identified which serve to rapidly guide command groups through the Action-Reaction-Counteraction wargaming cycle, minimizing the time required to orient participants to the tools, tasks, and background information necessary to wargaming. Four distributed wargaming exercises, including two Horizontal (Staff) and two Vertical (Command) exercises, were conducted with 20 Active Duty Officers – Majors and Captains. Results of the research provide a prototype example of an environment for distributed operations that can support Future Force research and training requirements. The results provide lessons learned for developing a distributed planning environment, including guidelines for the development of structured exercises, requirements for tools that facilitate collaboration, and measures for the assessment of wargaming performance.

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FOREWORD

Concept exploration and developmental research for the Army's transformation to the Future Combat Systems (FCS) is a key concern of the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI). As part of the effort, the Future Battlefield Conditions (FBC) Team of the Armored Forces Research Unit (AFRU) is conducting research to support the development of human performance measures required for FCS command and control (C^2). The FBC research supports work package (211) FUTURETRAIN and the Science and Technology Objective (STO) "Methods and Measures of Commander-Centric Training."

The objective of the present research was to develop a research environment to explore and assess the human performance requirements associated with the distributed nature of planning and wargaming anticipated in Future Force operations. This report describes the design, development, and initial evaluation of multi-echelon, distributed wargaming exercises and supporting tools comprising the research environment. Key design features of the research environment are identified which serve to guide command groups through the Action-Reaction-Counteraction cycle of distributed wargaming. Design stressed the need for more efficient and effective methods to prepare and conduct wargaming as well as the need to collect objective measures of human performance essential to wargaming and mission success.

The results of the research were briefed to members of the Armor School and training communities at Fort Knox including the Acting Director, Training, Doctrine, and Combat Development and Senior Instructor, Armor Captains' Career Course (Distance Learning). In addition, the Armor Captain's Career Course (Distance Learning) program at Fort Knox has requested and received the wargaming exercise materials for evaluation and possible incorporation into student training.

MICHELLE SAMS
Technical Director

DEVELOPING AN ENVIRONMENT FOR EXPLORING DISTRIBUTED OPERATIONS: A WARGAMING EXAMPLE

EXECUTIVE SUMMARY

Research Requirement:

The U.S. Army's Future Force will be required to perform command and control on-the-move using the network-centric capabilities provided by Future Combat Systems (FCS). Planning will be conducted in a distributed manner using methods and tools that facilitate dispersed operations. More specifically, planning must transition from a co-located, sequential, and staff-centered process to one that is distributed, simultaneous, and commander-centered. This report describes the development of a research environment for exploring and assessing distributed planning. Wargaming was selected as the representative planning task for the research because it involves much more than data calculation and information sharing. Wargaming is a human activity essential to mission success that encompasses the broad goals of stimulating ideas, highlighting critical tasks, and providing insights otherwise difficult to achieve during planning. The research environment was designed to overcome a number of shortcomings that often complicate command and control research to include excessive time requirements, unstructured exercises without adequate training objectives, and performance outcomes that are difficult to assess. Such environments are needed to replicate the tasks, conditions, and standards of performance for Future Force evaluation and training requirements.

Procedure:

The research effort began with a review and analysis of wargaming to identify human roles and responsibilities with an emphasis on distributed planning for the Current and the Future Force. As a result, design of the wargaming exercises focused on the iterative Action-Reaction-Counteraction cycle of wargaming that underscores human performance requirements. All exercises were set in a contemporary operating environment near the Caspian Sea and each exercise included five critical events within a proposed course of action (COA) based on the Box Technique of wargaming. A structured approach to exercise design was used to expedite the preparation and conduct of wargaming, to identify and control key tasks and conditions, and to develop objective measures as a basis for performance standards. At the same time, the design tried to provide an acceptable mix of structured versus free-play activity in wargaming.

In essence, the design scripted key roles and responsibilities for the participants during Action-Reaction phases that served as a basis for participants' free-play discussion and collaboration during Counteraction. Scripting allowed the research team to embed potential problems or measurement "hooks" into the proposed friendly COA (as part of Action materials) and into probable enemy responses to the COA (as part of Reaction materials). The problems concerned potential shortcomings in synchronizing the COA across battlefield operating systems (BOS) as identified, discussed, and addressed by wargaming participants during Counteraction. In addition, a set of tools were developed to enable communication and collaboration among the physically dispersed members of the command group in a manner anticipated for the Future

Force. The tools allowed participants to share text, graphics, and verbal communications during wargaming. Overall, four versions of a wargaming exercise with five critical events were designed to include Horizontal (Staff) and Vertical (Command) exercises for the Current and Future Force.

Measures of wargaming outcomes were developed to assess changes made or requested to the COA by the participants during Counteraction, with a particular focus on the BOS synchronization problems embedded in the exercise. Related measures were developed to assess how well the distributed participants established a common understanding of their COA, including recall of scripted information during Action-Reaction as well as COA changes and refinements during Counteraction. In addition, more subjective surveys were developed to obtain participant response to the design of the distributed environment and particularly the wargaming exercises. Overall, four Current Force wargaming sessions with multiple events were conducted in the ARI mini-lab at Fort Knox. A total of 20 active duty officers served as participants, with five participants assigned to each of two Horizontal (Staff) and two Vertical (Command) wargaming exercises.

Results:

An objective measure of wargaming outcomes assessed whether participants identified, discussed, and made COA changes to the BOS problems embedded in the structured exercises. Across all exercises, 72% of the embedded BOS synchronization problems were identified, 67% of the identified problems were discussed, and 59% of the identified problems were addressed by changes made or requested to the COA. Another outcome measure assessed each command group's common understanding based on their similar responses to multiple-choice questions about scripted and unscripted information related to their COA. Results indicated participants obtained a common understanding on many key aspects of the COA, such as position and re-position of friendly forces and adjustment to fire support plans. Across all exercises, the average agreement within each command group on the items assessed was 72%.

Survey measures supported a formative evaluation by asking participants to assess key features of the research environment. Between 90-100% of all participants endorsed the research environment with respect to read-ahead materials, tool training and certification, tool utility, and background materials including scripted Action-Reaction roles and responsibilities. Of special interest, 85% of all participants reported the distributed wargaming methods developed were applicable to actual operational environments including training centers and warfare. In addition, participants provided constructive criticism for improving the distributed wargaming methods and overall research environment.

In sum, the results indicate that the wargaming methods and measures developed represent a viable research environment for exploring and assessing distributed planning requirements for the Current and Future Force. The environment helped overcome key shortcomings that complicate command and control research including excessive time requirements, unstructured exercises without adequate training objectives, and performance outcomes that are difficult to assess. In particular, the results indicate that the investment made

in structuring exercises is returned in measurement gain, and in findings that relate more directly to evaluation and training objectives.

Utilization of Findings:

The results of the research were briefed to members of the Armor School and training communities at Fort Knox including the Acting Director, Training, Doctrine, and Combat Development, and Senior Instructor, Armor Captain's Career Course (Distance Learning). Methods and findings support development of the future research environments needed for distributed, simultaneous, and commander-centered planning in the Current and Future Force. The products of the research, including methods and measures for distributed wargaming, are documented in an Exercise Support Package (ESP) on compact disc available from ARI. The Armor Captain's Career Course at Fort Knox has requested and received these distributed wargaming products for evaluation and potential use in officer training, particularly distance learning.

DEVELOPING AN ENVIRONMENT FOR EXPLORING DISTRIBUTED OPERATIONS: A WARGAMING EXAMPLE

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DEVELOPING AN ENVIRONMENT FOR EXPLORING DISTRIBUTED OPERATIONS: A WARGAMING EXAMPLE

Introduction

The Army is preparing for a Future Force that will be more strategically responsive, deployable, agile, versatile, lethal, survivable, and sustainable across the full spectrum of military operations. The preparation entails a holistic revolution in doctrine, organizations, training, materiel, leadership and education, personnel, and facilities (DOTMLPF)[1]. Central to the Army's ongoing transformation is the requirement for more distributed operations during the planning and execution phases of a mission. More specifically, planning must transition from a co-located, sequential, and staff-centered process to one that is distributed, simultaneous, and commander-centered.

The goal of transforming to distributed planning raises a number of researchable issues. This report describes an effort to develop a research environment with methods and measures for exploring and assessing distributed planning. Wargaming was selected as the representative planning task for the research because it involves more than data calculation and information sharing. Wargaming is a human intensive activity with the goals of stimulating ideas, highlighting critical tasks, and providing insights otherwise difficult to achieve during planning.

Distributed and solidly structured planning exercises are prerequisite to establishing the tasks, conditions, and standards of performance for Future Force evaluation and training. The structure of an exercise can ensure realistic and representative planning problems are embedded as variable conditions that relate to tractable standards on the process and outcomes of wargaming for more effective evaluation and training. Structured exercises can also provide more efficient methods for planning and wargaming while stimulating realistic collaboration requirements.

Background

To facilitate and guide its movement towards the Future Force, the Army has established enabling transformation goals across the DOTMLPF spectrum. One such transformation goal concerns command and control (C^2) where transformation will be tied closely to development of Future Combat Systems (FCS). Key aspects of the transformation anticipated for C^2 are:

- Battle command for the Future Force will be characterized by a single unitary battle command system, integrated throughout all functional areas.
- The battle command system will maintain and share a common relevant operational picture (CROP) to enable visualization of the courses of action required to win a fight.
- Planning methodologies that support distributed and collaborative interaction, along with decision support tools, will assist the commander and staff at each echelon in analyzing potential courses of action. The planning methodologies will allow the

[1] Appendix A contains a list of all acronyms used in this report.

commander the option to rehearse plans with subordinate commanders and staff while dispersed and on the move.

- The battle command system will include smart search engines and intelligent agents that mine, understand, analyze, fuse, and distribute data in support of planning and execution operations.
- Training capabilities will be embedded into every Future Force C^2 system, allowing leaders to train their units as combined arms teams using virtual and constructive tools. The embedded training will provide a full-task framework for planning, training, and rehearsals, and provide feedback on unit and Soldier performance.

The transformation in C^2 will rest heavily on the development of FCS to create an unprecedented alliance of humans and machines. The alliance will pervade the force, particularly in the C^2 area where expectations about new paradigms are emerging. It is envisioned that the Future Force will have the capability to perform distributed planning, wargaming, and rehearsal while on the move. Supporting technologies will allow subordinate commanders and staffs to participate actively with their higher headquarters in streamlined planning and decision making processes in support of a collective course of action (COA).

Wargaming

Wargaming is a critical component of the Military Decision Making Process (MDMP) that is undergoing a transformation, as depicted in Figure 1. The current wargaming process is conducted as a series of sequential steps by staff groups. It relies heavily on human memory and computation to visualize battlefield dynamics, share information, and make decisions. The current wargaming process will give way to parallel planning, and eventually to simultaneous planning in which actions will be completed across multiple echelons by command groups, commanders and staffs, enabled by collaborative tools such as the CROP, smart search engines, intelligent agents, and the use of extensive shared databases. In sum, wargaming "will change from a sequential, staff-centered, planning focused process to one that is simultaneous, commander-centered and execution focused" (Department of the Army [DA], 2003a, p. 5-29).

In the Current Force, analysis of one or more COAs is conducted by wargaming (DA, 1997). Wargaming is a disciplined process with rules and steps that attempt to visualize the flow of a battle. Wargaming relies heavily on doctrine, tactical judgment, and experience to carefully analyze interdependent mission, enemy, terrain, troops, time, and civilian (METT-TC) factors. When time permits, wargaming should assess each operational phase of a COA in a logical sequence. Wargaming stimulates ideas and insights, highlights critical tasks, and provides familiarity with tactical possibilities otherwise difficult to achieve. The value added by wargaming is aptly summarized as: "Wargaming is the most valuable step during COA analysis and comparison, and should be allocated more time than any other step" (DA, 1997, p. 5-16). A more detailed discussion of wargaming is provided by Heiden (1995).

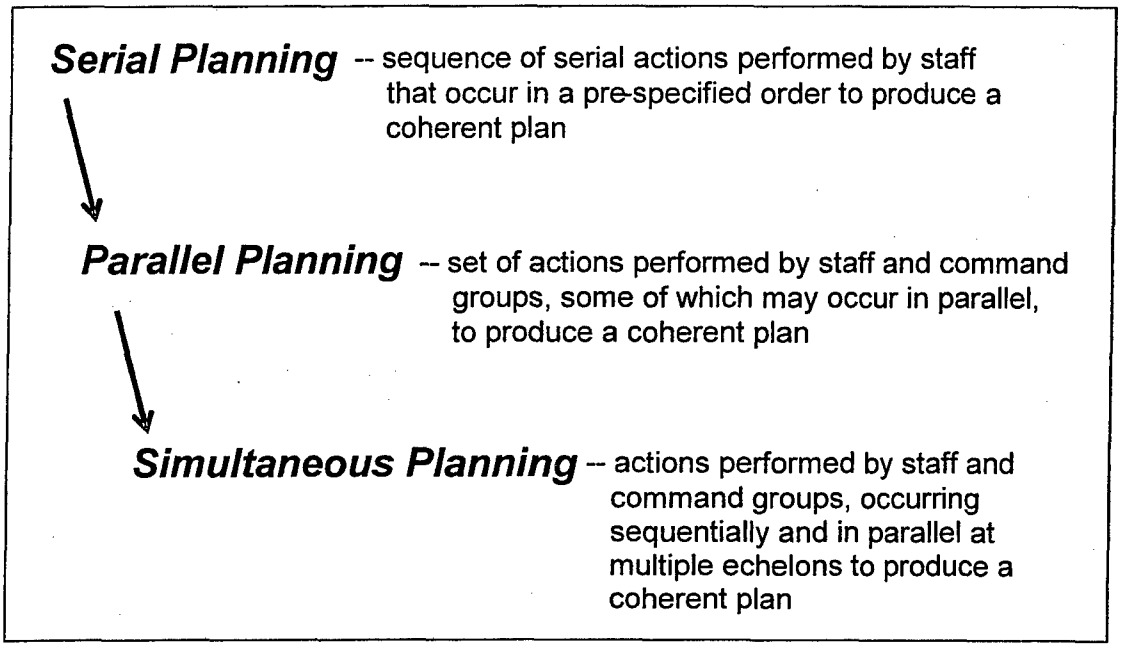

Figure 1. Evolution of the planning and wargaming process.

Conventional wargaming tools and methods severely restrict the wargaming process. Conventional tool limitations include the time-consuming and error prone reliance on static paper maps, acetate graphics, posted symbol sets, and tabular formats such as a synchronization matrix. Such tool limitations force a heavy reliance on human memory and computation to visualize battlefield dynamics and to record and share conclusions. As a result, wargaming doctrine stresses that the commander or his executive officer must determine how much time can be committed to wargaming. Conventional method limitations include a centralized (versus distributed) and top-down, traditionally staff driven analysis of a COA. The top-down approach does not readily include simultaneous multi-echelon perspectives that might be provided by subordinate commanders and combatants. Rather it requires serial wargaming by subordinate commanders and combatants who must subsequently analyze their more specific COAs nested within the overarching COA.

As the Army continues transformation to a digital force, the methods of wargaming will undergo iterative changes in concert with the new C^2 systems being fielded, tested, and integrated by Soldiers and leaders. The MDMP planning and wargaming methodologies will likely evolve to support geographically dispersed staff and command groups utilizing digital communications and collaborative tools to perform many functions currently completed face-to-face. With workstations connected via tactical networks, all members of command and staff groups will be able to view the same digitally mapped terrain and to access data in the form of photographs, graphics, and possibly live video. Sketches and graphics will be modified, manipulated, and supplemented through the use of an animated Whiteboard capability. A Whiteboard should provide the ability to modify graphic control measures and other visual information in a real-time collaborative environment where changes are simultaneously seen by all participants. Other capabilities supporting commander and staff coordination will include: a

"reach" capability where personnel can access references and doctrinal manuals, a voice communications system, text messaging, video conferencing, and shared databases.

Purpose and Objectives

As an initial approach to addressing distributed planning by the Current and Future Force, ARI initiated exploratory research to address the fundamental question of how groups might perform planning activities, such as wargaming, in a distributed environment. The purpose of the present research was the development of a research environment employing structured simulation-based exercises to explore and assess the methods, tools, and measures necessary to facilitate distributed wargaming. Key aspects of the environment were structured wargaming exercises for distributed staff and command groups, collaborative tools, and a set of performance measures to assess wargaming. To meet the overall purpose of the research, the following objectives were addressed:

- Design and develop a networked research environment for distributed wargaming that provides a CROP, an animated Whiteboard, and voice communications for visual and verbal collaboration.
- Design and develop structured exercises to support the conduct of planning and wargaming in a simultaneous, collective, multi-echelon and distributed manner. The distributed exercises require planning between higher and lower echelons (vertical integration) and across the same echelon level (horizontal integration). Tailor the design to an audience in which three to eight participants located in at least three separate or distributed locations interact directly and accomplish tasks collectively. Include collaborative, interdependent tasks (i.e., the task requirements for each participant will depend on the work of the other participants).
- Design and develop measures to assess the effectiveness of distributed wargaming. Performance assessment must address the outcomes of distributed wargaming to identify whether participants successfully identify and address problems or conflicts within a COA. Conduct a formative evaluation to gather participant feedback on the research environment, particularly the wargaming exercises and measures developed.

Method

A research environment was required to explore distributed operations. Research issues and approaches associated with human-system integration for future command and control (Lickteig, et al., 2002) were considered in the design of the research environment, as well as the communication requirements for multi-echelon distributed leaders suggested by Graves et al. (2004). The research effort began with a review and analysis of wargaming to identify human roles and responsibilities with an emphasis on distributed planning for the Current and the Future Force. As a result, design of the wargaming exercises focused on the iterative Action-Reaction-Counteraction cycle of wargaming that underscores human performance requirements. All exercises were set in a contemporary operating environment near the Caspian Sea and each exercise included five critical events within a proposed course of action (COA) based on the Box Technique of wargaming.

A structured approach to exercise design was used to expedite the preparation and conduct of wargaming, to identify and control key tasks and conditions, and to develop objective measures as a basis for performance standards. At the same time, the design tried to provide an acceptable mix of structured versus unstructured or free-play activity in participants' wargaming. The exercises were employed in a series of four research sessions which examined distributed wargaming performance, and also served to formatively evaluate the research environment.

Structured Exercise Design and Development

Analysis of the Wargaming Process. Field Manual 101-5 (DA, 1997) describes a process for wargaming in which a commander and staff normally analyze several COAs using evaluation criteria that have been established prior to the start of the wargaming process. Decision criteria allow assessment of the effectiveness and efficiency of one COA against another. In a situation with severe time constraints, the commander may direct the staff to wargame only one course of action. In addition, the commander may also direct the staff to wargame the COA against a single Enemy COA (ECOA) rather than completing a comparison using both the most likely ECOA and the most dangerous ECOA (DA, 1997).

Typically the commander and staff must determine the wargaming technique that will be employed: Belt, Avenue-in-Depth, or Box. The Belt Technique is based on a sequential analysis of the events that are likely to occur for a COA. The Avenue-in-Depth Technique focuses on a single avenue of approach and is used primarily for offensive operations. The Box Technique is a detailed analysis of a critical area, such as an engagement area, and is most useful when time is limited. Figure 2 illustrates the key features of the Box Technique that was selected for the current research because it focuses on clearly identifiable critical events which were expected to provide a relatively firm basis for structuring the wargaming exercises. In addition, during an abbreviated planning process the commander and staff will normally use the Box Technique focusing on the most critical event first. As time permits, other events are normally analyzed based on the priority of the events as determined by the commander.

At the heart of the wargaming process is an Action-Reaction-Counteraction cycle as shown in Figure 3. Action generally pertains to those activities initiated by the force on the offensive, the role played by wargaming participants in the current research. Reactions are the other side's actions in response, the enemy's role in the current research. Counteractions are the first side's subsequent responses to the other side's reactions. The sequence of Action-Reaction-Counteraction is continued until a critical event is completed or the commander determines that he must use some other COA to accomplish the mission.

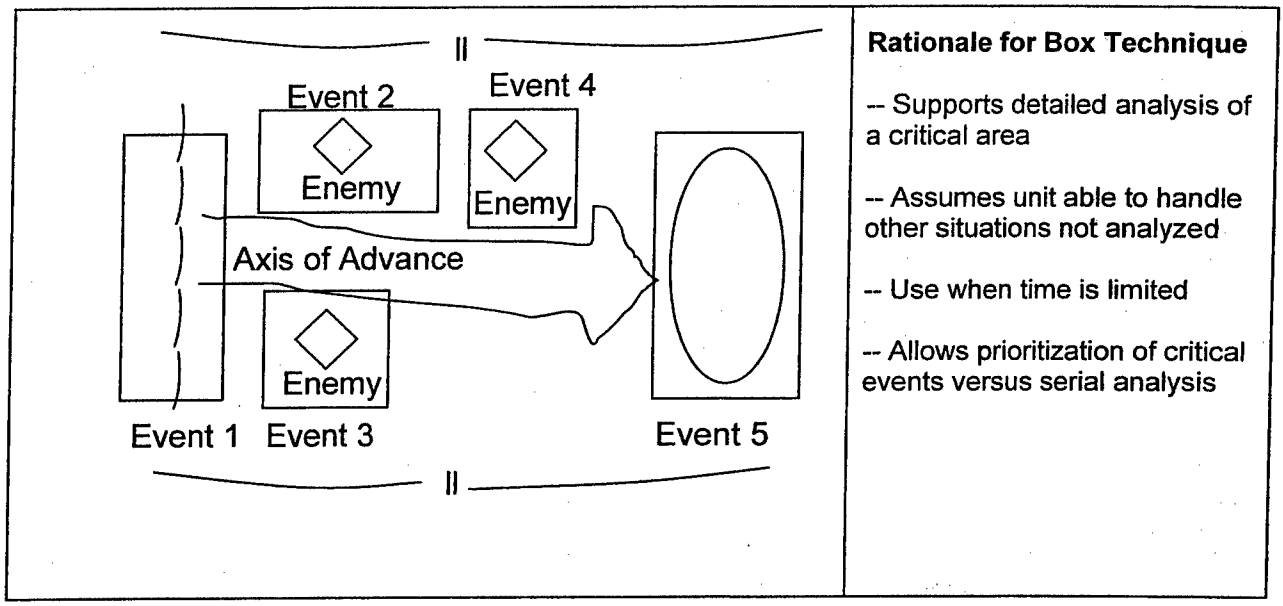

Figure 2. Box Technique for wargaming.

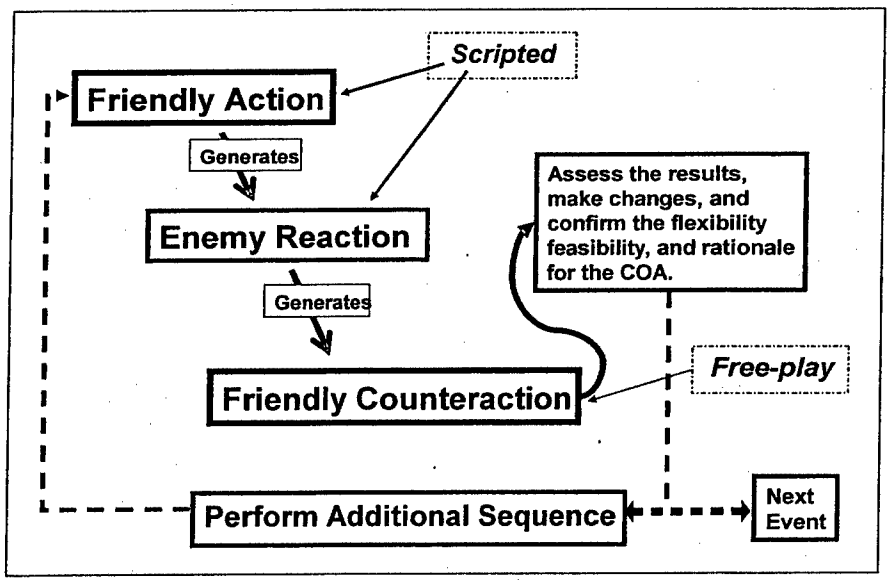

Figure 3. The Action–Reaction–Counteraction cycle adapted for distributed wargaming.

Typically, the friendly unit's proposed actions are portrayed by the operations officer or by the commander of the unit. Other staff officers identify the combat support and combat service support assets, along with the necessary synchronization required to support the action. Typically, the friendly unit's intelligence officer role-plays the enemy commander and tries to win the wargaming event for the enemy to ensure that the commander and staff fully address the enemy's strengths and weaknesses. During Counteraction, the commander and staff generally review the Action and Reaction inputs in order to validate the COA or modify the COA to account for the operational problems or opportunities identified.

Notably, the Friendly Action and Enemy Reaction phases of the wargaming exercises developed for the present research were fully scripted. The participants read the scripted text to share key background information quickly and uniformly. Typically, much of this background information would have been developed by the staff prior to wargaming.

The wargaming process has been used for many years in face-to-face settings where planning is conducted by the unit staff (i.e., horizontal planning). A research issue was to assess if more traditional methods, namely the Box Technique and the Action-Reaction-Counteraction cycle, might adapt to distributed wargaming. A related issue was to examine if traditional staff-oriented methods might work for command group wargaming.

Structured Exercise Design. To reflect the contemporary operational environment, the exercises were based on the Caspian Sea/Azerbaijan scenarios contained in the Unit of Action (UA) Operational and Organizational (O&O) Plan (DA, 2003b). Furthermore, the specific scenario "Rapid Advance to Enemy Center of Gravity" was selected for exercise development. A key initial design task was to identify and prepare supporting materials for a series of critical events within the scenario selected. Five critical events based on the Box Technique were identified for the wargaming exercise:

- Task Force (TF) secures passage lane and conducts intelligence, surveillance, and reconnaissance (ISR) operations.
- TF moves to the objective area.
- TF isolates the objective.
- TF seizes key urban terrain/features.
- TF executes key stability tasks.

A combination of regular and asymmetric paramilitary forces was selected as the threat force for both Current and Future Force versions of the wargaming exercise. The Current Force versions reflect today's Army's operations and organization; the Future Force versions are network-centric, rely heavily on sensors and other robotic elements, and task organize units according to the UA O&O.

The exercise was designed at the battalion level for the Current Force (i.e., a Battalion Task Force) and the Future Force (i.e., a Combined Arms Battalion). All versions of the exercise were designed for five primary and other alternate participants in Horizontal (Staff) and Vertical Command) conditions, as indicated in Figure 4.

The next step in the design of the exercises was to identify a set of key problems to serve as "hooks" for performance measurement. One of the fundamental goals of wargaming is to make sure the various battlefield operating systems (BOSs) are synchronized. A simple example of synchronizing a BOS would be that fuel (Logistics BOS) is available to a maneuver unit (Maneuver BOS) when and where it is needed. Each of the five critical events was analyzed to identify and develop a representative set of BOS synchronization problems and trigger events that would indicate a lack of synchronization.

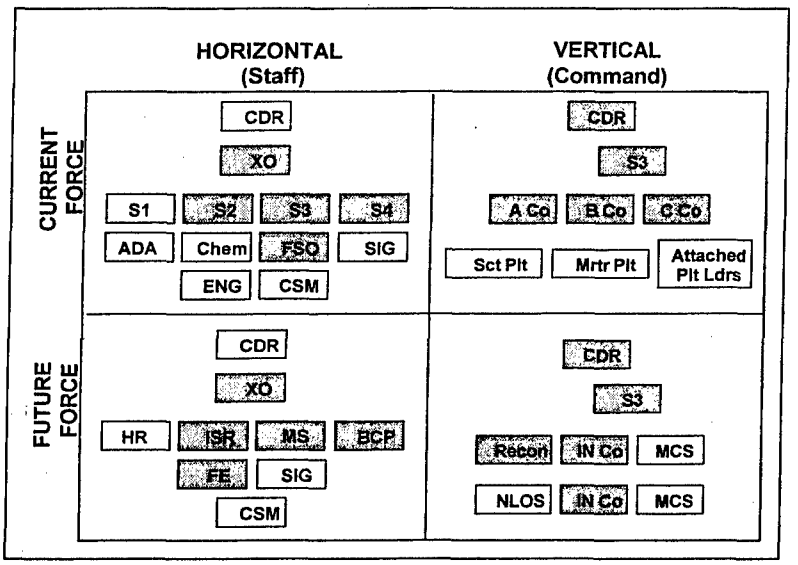

Figure 4. Primary participants for distributed wargaming (alternate participants shown in gray-shaded boxes). Note. All acronyms are defined in Appendix A.

The trigger events were established during exercise design to specify what needed to happen for a problem hook to occur and how the exercise could be designed to make that happen. The hooks served as a basis for assessing wargaming outcomes, namely whether the group identified, discussed, and made or requested changes to the initially proposed COA. Examples of problem hooks for Events 1 and 2 from the Horizontal (Staff) exercise are shown in Figure 5.

Hooks in Event 1 –TF secures passage lane and conducts ISR Ops

- Need to identify potential ambush sites
- Need fire support for scouts
- No casualty evacuation assets with sections
- Need retransmission capability for forward command post to control ISR operation at task force level

Hooks in Event 2 –TF moves to objective area

- Need to identify choke points on canal
- Need to support intelligence danger points
- Need to address canal crossing
- Need to secure soft assets
- Need fuel and repair before objective

Figure 5. The problem hooks for Events 1 and 2 from the Horizontal (Staff) exercise.

With the problem hooks specified, design and development focused on creating the specific exercise activities and resources for each primary participant to include maps, overlays and briefing materials. This included specifying the scripted actions and information required for each participant during the Action phase and for the surrogate threat commander during the Reaction phase. Four versions of the wargaming exercise with five critical events in each version were designed: Current Force - Horizontal (Staff), Current Force - Vertical (Command), Future Force - Horizontal (Staff), and Future Force - Vertical (Command).

Notably, the wargaming sessions conducted for this research were limited to the Current Force versions, in large due to the emerging nature of Future Force organizations and operations. The Army's transformation from the Current Force to the Future Force will be an iterative and extended process, a continuum of change not a discrete event or moment. Thus the research focused on more distributed and commander-centered wargaming by introducing these concepts into the Current Force versions of the wargaming exercise. While the Current Force does not presently conduct battalion level wargaming in a distributed and commander-centered manner, it is an essential proving ground for assessing and refining these concepts for the Future Force. As a result, all of the required wargaming materials, methods, and measures for the Current Force exercise versions were fully developed, as indicated in Appendix C. The Future Force exercise versions were only partially developed, as also indicated in Appendix C, to provide a transfer template for future evaluation and training efforts.

To structure and expedite the wargaming exercise, much of the MDMP information and materials typically developed prior to wargaming were pre-scripted and provided to the participants as part of their Read-Ahead materials. As noted, scripting addressed the key roles and responsibilities of the participants during the Action-Reaction phases to provide a structured and more tractable basis for assessing participants' free-play discussion and collaboration during the Counteraction phase, as illustrated in Figure 3.

Wargaming Materials. The key materials developed to structure and support the wargaming sessions were identified as: Read-Ahead, In-Brief, Training/Certification, Job Aids, Task Force Update, Execution Guides, and Final Survey.

The Read-Ahead materials listed in Table 1 were provided to each participant individually several days before their scheduled wargaming session. They were designed to provide information needed to understand the research goals and objectives and to familiarize them with the overall tactical situation within which the exercise events would be presented. The materials also provided a primer on the wargaming process. Appendix B contains a sample of preparation materials for a Horizontal (Staff) exercise. Materials used for the In-Brief were adapted from those provided for the Read-Ahead. The In-Brief provided participants with information on the operational scenario at the Task Force level and reviewed the key steps/products in the distributed wargaming process. Training/Certification materials and Job Aids (see Appendices D and E for examples) are described in greater detail in the Procedure section of the report.

The Task Force Update provided the products of the MDMP that would normally be produced at the Battalion/Task Force level and were developed to set the operational stage for

the participants to conduct the wargaming exercise. A sample of Task Force Update materials is shown in Figure 7 which presents the Threat Overview - Current Situation update information. During each exercise tactical materials, such as map overlay graphics and Commander's Critical Information Requirements, were provided to the participants through a simulated tactical internet tool to set the conditions for the Counteraction phase of wargaming. A detailed set of tactical materials used in the Vertical (Command) exercise is contained in Appendix F. The last element of the exercise session, the Final Survey, is described later in this section under the heading Measurement to Improve Wargaming Performance.

Table 1

Materials Included in the Read-Ahead

Section
Introduction
Purpose
Objective
Contents
Wargaming
Definition
Relationship to MDMP
Distributed wargaming process
Distributed wargaming steps
Exercise Overview
Wargaming exercise
Event descriptions
Roles supported in exercise
Exercise tools/equipment
Prior to exercise
During exercise
After exercise
Operational Scenario Extract
Strategic setting
Operational setting
Higher headquarters commander's intent and concept
Task Force commander's initial guidance
Threat situation
Additional operational materials

An Execution Guide was developed for each participant for each of the five critical events for the Horizontal (Staff) and Vertical (Command) exercise versions. The Execution Guides provided guidance on the overall wargaming process and purpose, the scripted text for the Action-Reaction phases of the event, and additional guidance on conducting Counteraction and subsequently completing a critical event. A sample Execution Guide for one of the participants, the TF S2 (Intelligence Staff Officer), in the Horizontal (Staff) condition is included in Appendix G.

In addition to providing basic tactical background information for the event, the primary purpose of the Execution Guide was to script the Action and Reaction phases of the wargaming.

The Execution Guide included specific and detailed scripts for each of the participants which could be read verbatim or paraphrased closely. The use of a script ensured that each group would enter the free-play portion of the event, the Counteraction phase, with the same task conditions.

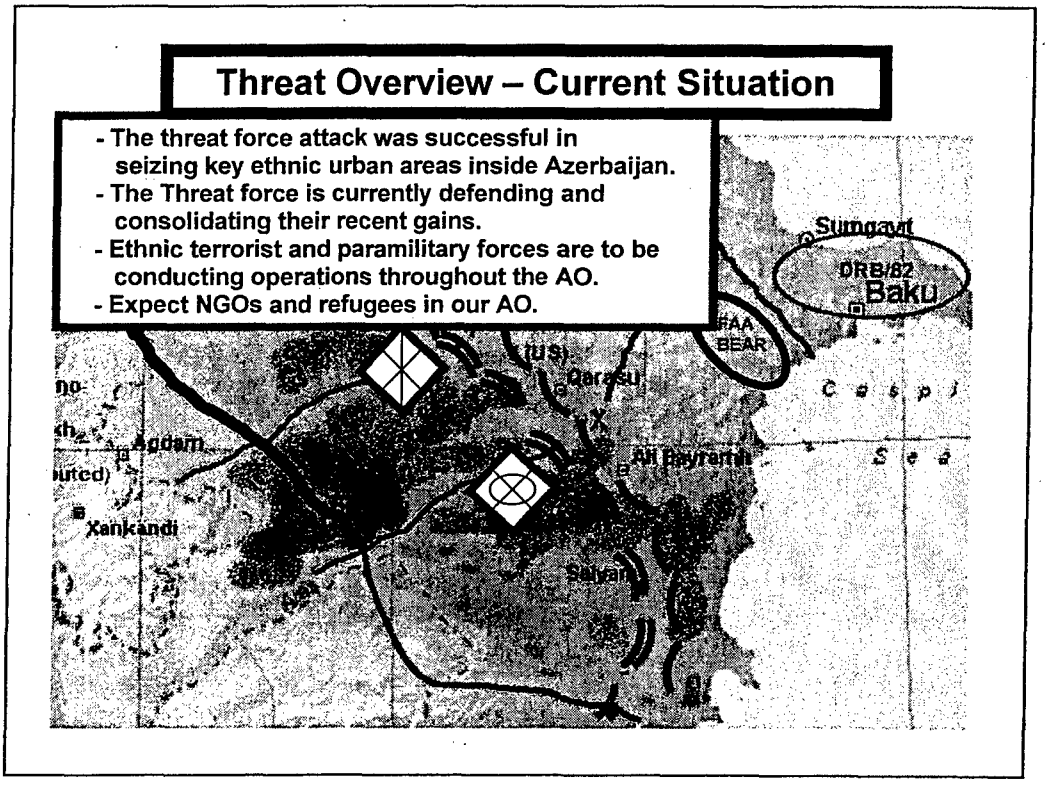

Figure 6. Sample of tactical materials provided to participants.

Research Environment and Collaborative Tools

Key components of the research environment included the physical setting and the set of collaborative tools developed for conducting distributed wargaming.

Physical Setting. The very nature of distributed operations requires that the participants be separated and that they communicate and interact using tools that support collaboration. Figure 8 presents an illustration of the physical setting designed and developed at the ARI mini-lab at Fort Knox to support distributed wargaming. The physical environment consisted of five identically configured workstations located in four rooms. Due to room constraints, two workstations were located in the same room with two of the participants (S2/A Co and S4/C Co) working in separate sections of the room. Each workstation consisted of a Pentium 4 computer running Red Hat Linux in a dual-monitor configuration. In addition, there was a master control room which included a workstation from which the threat commander/exercise controller could observe the exercise and provide scripted inputs. In addition, a separate control workstation was used to build and initialize the wargaming exercise and monitor wargaming activity. Each participant room contained a small, unobtrusive video camera focused on the workstation that

was used to record the actions of the participants and the displays on each workstation. In the room with two participant workstations, the camera was directed at the S2/A Co duty position; the S4/C Co duty position workstation was not recorded. All camera feeds went to a single video recorder which supported the capture of the entire exercise on one system for simultaneous playback of four participants' performance in a single quad-view display.

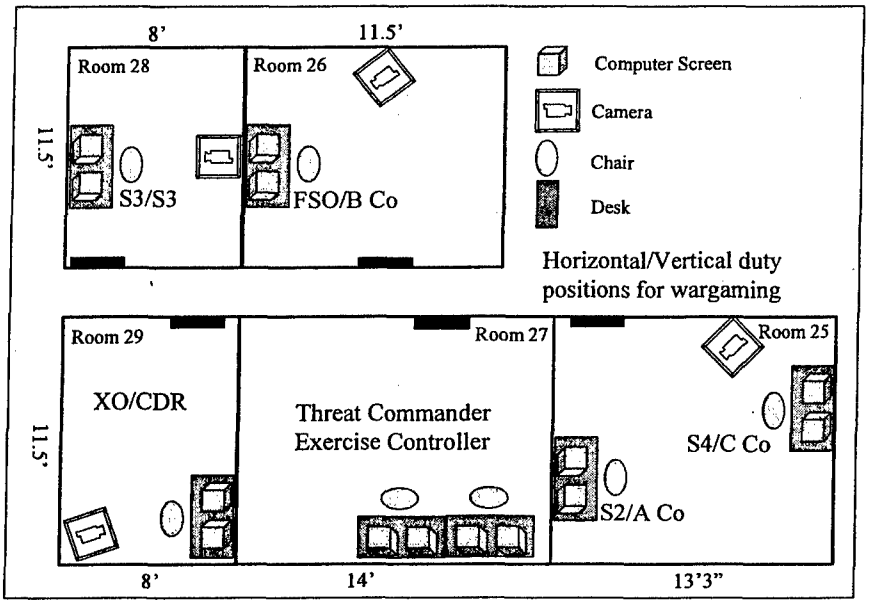

Figure 7. Physical layout of the ARI mini-lab used for distributed wargaming.

User Collaborative Tools. The user collaborative tools included the graphic interface and software applications required to complete the structured exercises. A determination of the types of applications and tools required was made based on FM 6-0 (DA, 2003a) and the U.S. Joint Forces Command Concept Primer for a Collaborative Information Environment (U.S. Joint Forces Command, 2003). The documents identified the tools and methods used to conduct wargaming in the Current Force when equipped with digital systems and also provided indications of similar but more advanced wargaming tools and methods anticipated for the Future Force. Key tool requirements were: the ability to send messages by voice and digital text; the ability to display and modify maps and overlays via a shared and animated Whiteboard; and the ability to access or reach electronic information files for supporting information. For the present research these requirements were met by adapting and developing the following tools and software applications:

- Voice Communications – Hand-Held FM Radios.
- Text Message Communications – Collaborative Notepad.
- Whiteboard – Surrogate Command Control Communications and Computers (SC^4).
- Reach – Simulated Tactical Internet.

Voice communications between the participants were delivered using hand-held FM radios simulating the radio nets that exist in an operational environment. The radios were commercial, low-cost, FM transmit-and-receive voice communication devices. The text message communication capability was provided by the Collaborative Notepad application illustrated in

Figure 8. The notepad software simulated the anticipated operation of a future distributed environment by allowing participants to post and exchange text messages with other participants and with other personnel (e.g., surrogate staff members from higher headquarters) in real time without the need to submit information requests. Thus the notepad served both as a means of communication among the group doing the wargaming and between the group and other surrogate personnel supporting their efforts.

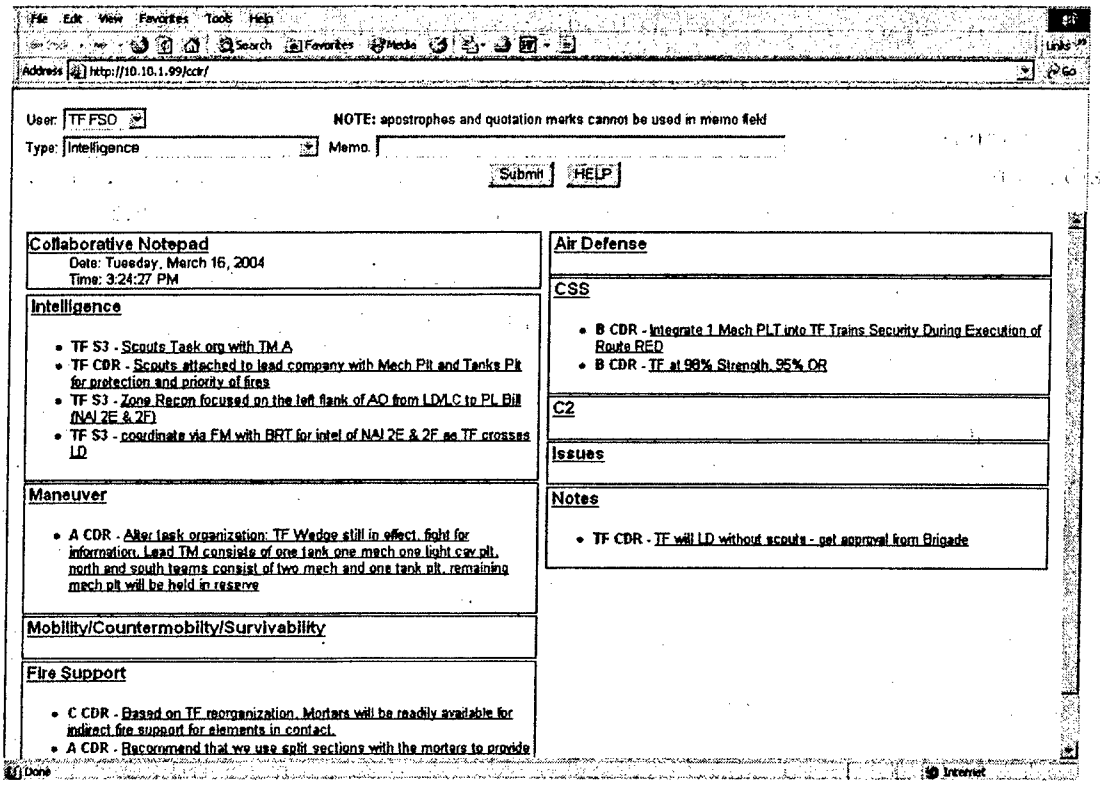

Figure 8. Collaborative Notepad application.

The animated Whiteboard capability with modifiable maps and overlays was provided by the SC^4 simulation software application obtained from the Unit of Action Maneuver Battle Lab (UAMBL) at Fort Knox and illustrated in Figure 9. The SC^4 is a dual screen application providing maps and overlays on one screen and tools to manipulate the maps and overlays on the second screen. The screen configuration for the SC^4 application is user-configurable. However, for the wargaming exercises all users were configured with the tool screen on the left and map screen on the right.

The SC^4 application provided a CROP and allowed each participant to navigate on the terrain map, change map scale, and display or remove any of the overlays available for a given exercise. The left screen included tool buttons that provided the ability to "draw" on the various overlays thus allowing the participant to add graphic control measures and other symbols. It also included a button to access a conferencing capability that allowed participants to share their changes or additions to the maps and overlays in real-time. The SC^4 simulation software application was selected for these capabilities because it operated with the One Semi-Automated

Force (OneSAF) Test Bed (OTB) application. The SC^4 link to simulation provided the capability to display the movement of entities on the battlefield (e.g., friendly and enemy forces), including the potential of animating COAs in support of participants' wargaming.

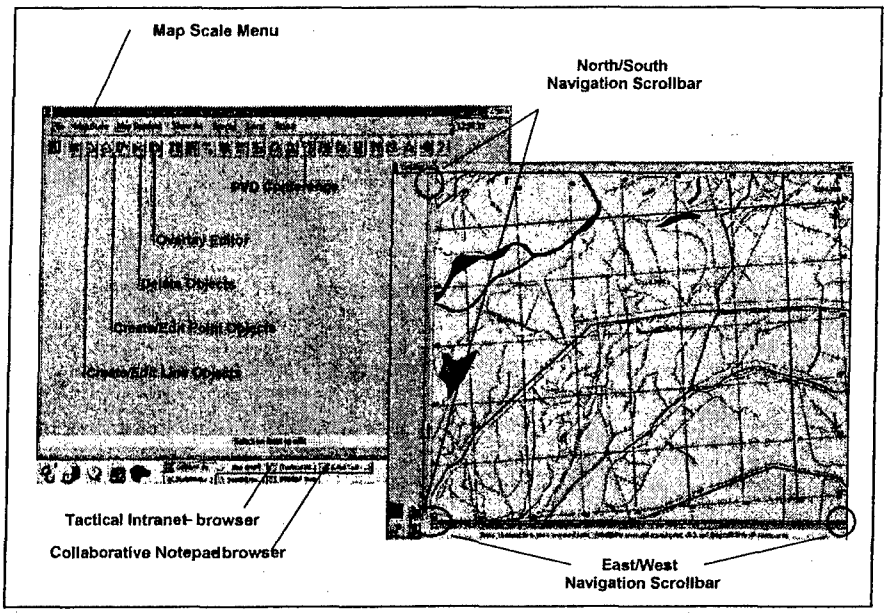

Figure 9. Map, overlay and Whiteboard applications.

The ability to access various information sources was provided by the Reach Application which simulated a tactical internet, as illustrated in Figure 10. The application provided a login and simulated the ability of future systems to customize information based on the identity of the requestor. It also simulated the ability to reach anywhere on the tactical internet, although that capability was not employed in the exercises. The Reach Application was primarily used by the participants to access the TF Update.

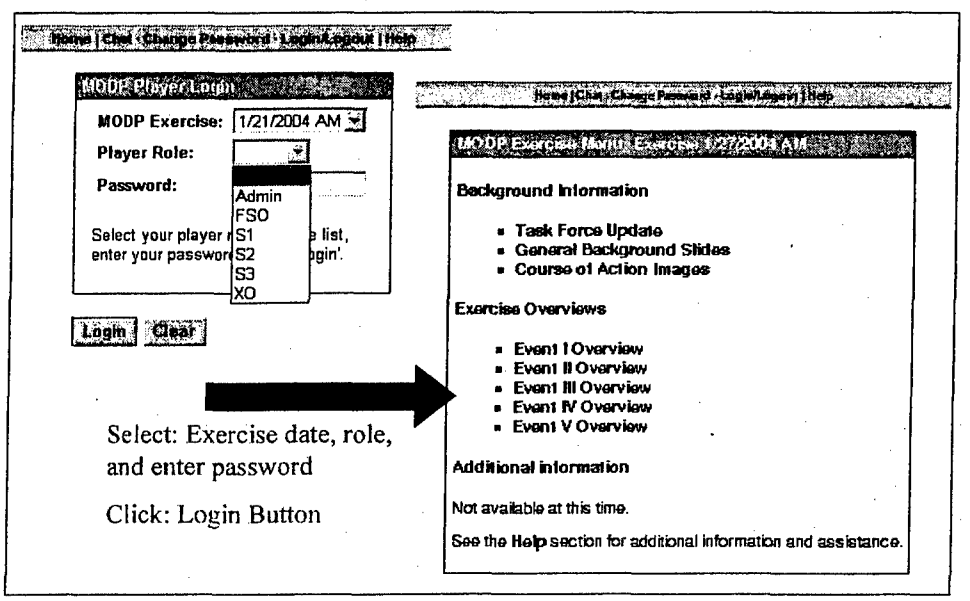

Figure 10. Reach Application used in distributed wargaming.

Measures to Improve Wargaming

Measures were developed to assess wargaming outcomes and support the formative evaluation of the methods, materials, and measures developed to create a research environment for distributed planning. The BOS Synchronization Rating Form was developed to estimate the ability of the participant groups to identify, discuss, and make or request changes to BOS problems (hooks) embedded within the COA. The Post-Event Survey was developed to assess the ability of the group to develop a common understanding of the operational situation and COA for each exercise event. The participant group's common understanding was based on the ability of group members to recognize factual information shared in the exercise and key decisions made by the group in refining the COA. The Final Survey was developed to gather participant feedback for improving the methods, materials, and measures used to create a research environment for distributed planning. In addition, electronic recordings were made of participant performance during all exercises and events including the Collaborative Notepad text entries used to make and request changes to the COA.

Wargaming Outcome Measures. The ability of the group to identify synchronization problems and modify the COA accordingly is an important purpose of wargaming. Each exercise event included multiple hooks – typically four to six – which represented embedded BOS synchronization problems. The BOS Synchronization Rating Form for assessing this ability is illustrated in Figure 11.

The synchronization rating form shown in Figure 11 is from a Horizontal (Staff) exercise. For each event, the hooks or embedded BOS synchronization problems are listed in the column labeled "Problem." These represent specific points in the event where there was a lack of synchronization in the BOSs as a result of the Triggering Event listed in the second column. For each problem listed, observers rated whether the participant group identified the problem, discussed the problem, and made or requested a change to the COA, by checking the corresponding columns on the form. Scoring for this instrument consisted of counting the number of times the problem related actions were checked for a given column and converting that number to a percentage of the total hook problem items presented in the column. A sample BOS Synchronization Rating Form complete with rater instructions is included in Appendix H.

The BOS Synchronization rating categories are interdependent. In general, a wargaming group will first identify a synchronization problem, then discuss it, and finally make or request a change to the COA. For the current research, the raters did not attempt to judge the adequacy of the group's COA changes or requests, namely did they provide adequate *solutions* to the BOS problem. Assessing the adequacy of the group's COA changes is recommended in future efforts, but that may require raters with substantial military subject matter expertise.

The Post-Event Survey was designed to assess the ability of the group to develop a common understanding of the operational situation based on their wargaming activity. A separate four-item Post-Event Survey was developed for each of the five critical events and administered to each participant at the completion of the event. Three of the items required that the participant recall scripted information shared among the participants during Action-Reaction phases of the event, such as threat location, threat disposition, and key terrain features. The remaining item assessed whether the participant knew what the group's Counteraction change or

	BOS's not syncronized with maneuver plan...		Level of consideration given to BOS sync.			
	Problem:	Triggering Event:	Identified	Discussed	COA Changed	score
Event 1	**Intel**: Need to ID potential ambush sites.	< Scouts ambushed by paramilitry				=
	Fire Spt: Need fire support for scouts.	using technicals w/RPGs as they				=
	CSS: No CASEVAC assets with scts.	cross choke point of canal berms.				=
	C2: Need retrans or Fwd CP to control ISR operation at TF level.					=
Event 2	**Intel**: Need to ID choke points on canals.	< More resistance than expected				=
	Fire Spt: Need to support INTEL danger points (more developed FS plan).	in the form of more ambushes will require more fire support.				=
	Mobility: Need to address canal crossing.	< Canal found flooded by enemy.				=
	CSS: Need to secure soft assets.	< Raids on rear area inside AO.				=
	CSS: Need fuel & repair before objective.	< Long moves require fuel/repairs.				=
Event 3	**Fire Spt**: Need smoke to hide approach.	< Enemy can see approach march				=
	Intel: Need element detailed to observe low ground behind objective to isolate it.	< Dead space behind the objective allows enemy to avoid isolation.				=
	Intel: Vulernable flanks endanger the forces trying to isolate the OBJ.	< Enemy in hide positions on flanks, often outside our AO, are				=
Event 4	**Intel**: Need to ID decisive bridges for assault.	< Enemy blows bridge and				=
	Fire Spt: Need to conceal approach march.	executes complex ambush.				=
	Intel: Need to mass power against enemy.	< Assault goes into en strength.				=
	Mobility: Need to position engineers/AVLBs to assist assault and/or change assault lanes	< Flooded canals inhibit easy assault into OBJ.				=
Event 5	**Intel**: Need a liaison with local SOF to gain intel on local centers of gravity (friend&en).	< Various local contacts are made with offers and information.				=
	Intel: Need an element dedicated to refugee camp control until higher can assume resp.					=
	CSS: Need immediate aid to refugee camp.	< Multiple civilian casualties, as well as thirst and hunger.				=
	CSS: Need to acquire materials for security.	< Need to construct secure CPs.				=
		Percentage Assessment: c			cumulative score:	/
		no. of "0" scores:	of =	%		
		no. of "1" scores:	of =	%		
		no. of "2" scores:	of =	%		
		no. of "3" scores:	of =	%		

Figure 11. Example of a BOS Synchronization Rating Form.

requested change to the COA was for a key problem embedded in the event, such as the positioning and re-positioning of friendly forces, or changes to fire support. Estimates of the group's common understanding were based on the extent of participant agreement on the four items.

An example of a Post-Event Survey is provided in Figure 12. The Post-Event Surveys for the five events in the Current Force Horizontal (Staff) exercise are included in Appendix I. In this example, questions 1, 2, and 4 assessed participants' recall of selected scripted information that should have been exchanged during Action-Reaction phases. Question 3 assessed whether the participant recalled what, if any, COA change was made or requested by the group during Counteraction given "the prospect of increased enemy resistance against our ISR operations."

Survey – Event I (ISR Operations before TF Line of Departure [LD])
Please circle the one best answer that you agree with.

1. What level of enemy resistance did the Intelligence Officer (S2) believe would be present in the Area of Operations at the beginning of the wargaming?
   a. Armenian Regular Army forces would defend in place.
   b. Enemy conventional forces and paramilitary forces would withdraw, with only some resistance at the objective area.
   c. There would be no real resistance to our operation.
2. Which of the following is NOT a feature of terrain in our Area of Operations?
   a. Canals with berms which may impede mobility.
   b. Dense forests which may hide enemy forces.
   c. Villages/urban which may provide cover/concealment for enemy forces.
3. How did the group decide to respond to the prospect of increased enemy resistance against our ISR operations?
   a. We added the mortar platoon to the scout platoon.
   b. We added the mortar platoon and some extra combat maneuver elements (more tank or Infantry Fighting Vehicle (IFV) platoons).
   c. None of the above.
4. What types of fire support are available to the scout platoon in this phase of the operation?
   a. Field Artillery from our direct support (DS) battalion.
   b. Close air support (CAS) from United States Air Force (USAF).
   c. Neither of the above.

Figure 12. Example of a Post-Event Survey.

Formative Evaluation Assessments. The Final Survey was developed to support the formative evaluation of the research environment, as documented in Appendix J. The Final Survey asked the participants to assess key features of the research environment including read-ahead materials, tool training and certification, tool utility, and background materials including scripted Action-Reaction roles and responsibilities. It also asked them to assess the applicability of the distributed wargaming methods developed to actual operational environments including field training centers and warfare. The Final Survey also included open-ended items to assess the best and least useful features of the wargaming process.

Electronic Performance Recordings. Videotape recordings were made of participants' performance during each of the four wargaming sessions conducted to serve as a behavioral record of the wargaming process. The recordings automatically captured many key aspects of the wargaming process including the sequence of behaviors supporting the exchange of verbal and written information as well each participant's contribution to the wargaming exercise. Electronic files on the collaborative tools used were also saved which included, for example, all entries made on the Collaborative Notepad. An illustration of the mini-lab set-up for electronic recordings is provided as Appendix K.

Procedure

Four wargaming exercise sessions were conducted over a two week period – two sessions each for the Horizontal (Staff) and Vertical (Commander) exercise conditions. Each session lasted approximately four hours and followed the schedule described previously as illustrated in Figure 6. Each session involved five active duty Soldiers – one Major and four Captains – assigned to the primary participant roles identified in Figure 4 by experimental condition. The participants had a variety of backgrounds and experience levels. All but one had graduated from the Armor Captain's Career Course, and the field grade officers were in their branch qualifying positions.

The Participant Read-Ahead materials were provided to the participants at least two working days prior to their scheduled session. The exercise In-Brief covering much of the same material was conducted during the first hour of the experimental session. The Read-Ahead and In-Brief supported the exercise's preparation objectives shown in Figure 13, orienting the participants to the purpose of the session and to their role in the process.

Following the In-Brief, participants received tool familiarization information in a group session followed by individual training and certification on the tools at their assigned workstation. A trainer/observer (T/O) assigned to each participant provided supplementary assistance as required during the training/certification session which required approximately 40 minutes. Training also included several key group collaboration activities, particularly use of the SC^4 tool for visually reviewing and revising the COA. The materials used for training and certification are provided in Appendix D, and the set of job aids on collaborative tool use given to each participant is provided in Appendix E.

The Task Force Update was conducted by the participants using the collaborative tools, primarily the simulated tactical internet, based on scripted materials. The information provided was intended to bring all participants to a common level of understanding on supporting MDMP activities that formed the basis for the wargaming events that followed.

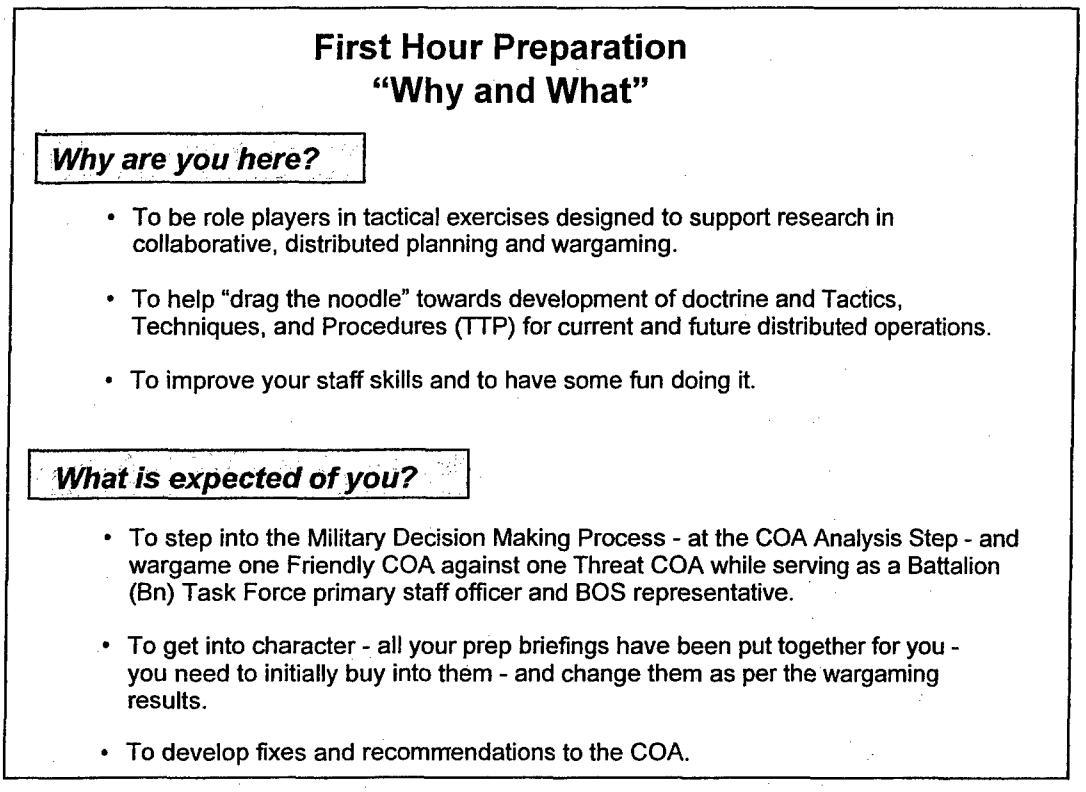

Figure 13. Overview briefing slide for wargaming preparation.

Participants began wargaming their first critical event in the COA after approximately 90 minutes of exercise preparation activities. During the Action-Reaction phases of the event, participants played their assigned roles following the scripts included in their execution guides. The T/Os were available at all times to provide any assistance in using the collaborative tools, but were instructed not to assist the participants in wargaming. Any participant questions related to the wargaming itself were directed to the participant assigned to the TF leader role, either TF Commander for the Vertical (Command) condition or Executive Officer (XO) for the Horizontal (Staff) condition.

The free-play Counteraction phase was led by the TF leader and continued until the TF leader determined that all essential changes to the proposed COA had been made or requested. The next critical event commenced approximately five minutes later, after the mini-lab systems and tools were configured for the next critical event selected by the TF leader per the Box Technique for wargaming. The sequence and procedure of scripted Action-Reaction phases followed by free-play Counteraction was repeated for each remaining critical event completed during the four hours allotted for the session.

At the conclusion of each critical event, the five participants in the wargaming group individually completed the Post-Event Survey designed to estimate their success in information sharing in the distributed environment. Following completion of each group's final event, participants completed the Final Survey followed by a short out-brief. During each exercise event, two observers completed the BOS Synchronization Rating Form for that event based on the wargaming discussions and activities observed.

Results

The results document the current status on ARI's effort to assess and refine methods and measures for distributed wargaming and provide an empirical basis for improving wargaming efficiency and effectiveness. Notably, all results are regarded as preliminary due to the exploratory nature of the research. Limitations in the present research include: small sample size, first assessment of a prototype method for presenting structured wargaming exercises, collaborative tools that require further refinement, and participants assigned to ad hoc staff and command groups for wargaming. Results on wargaming outcomes were obtained based on observer ratings on the BOS Synchronization Rating Form and participants' agreement on Post-Event Survey items. The Final Survey supported formative evaluation of the research environment. Overall, three of the four participant groups completed three of the five critical events during the time allotted. The remaining group completed two critical events during the time allotted.

Outcome Measure Results

BOS Synchronization. The BOS Synchronization Rating Form provided estimates of how well groups were able to respond to key BOS synchronization problems embedded in the proposed COA. This measure was based on the ratings made by two independent raters on participant activity during the Counteraction phase of wargaming. Three separate ratings were made: was the problem hook identified; was it discussed; and was a potential solution recorded, namely a change or request to change the proposed COA?

In analyzing the BOS synchronization data it is necessary to account for the fact that the three ratings are not independent. Discussion and potential resolution of a synchronization problem are largely dependent on the group first identifying the problem. The lack of independence is reflected in the results reported by presenting the problems discussed and solutions recorded as a ratio or percentage of the problems identified. The results in Table 2 indicate that on average, across both Horizontal and Vertical conditions, 72% of the BOS synchronization problems were identified, 85% of problems identified were discussed, and 76% of problems identified led to potential solutions in the form of changes made or requested to the COA. These data suggest that participants recognized many of the problem hooks embedded in each wargaming event, and routinely discussed and attempted to resolve the BOS problems they identified. More detailed data on BOS synchronization ratings are provided in Appendix L.

Table 2

Frequency and percentage of BOS synchronization indicators (contingent scoring)

	BOS Synchronization Ratings		
	Problem Identified	Problem Discussed	COA Change Recorded
Horizontal (Staff) Exercise			
Exercise 1			
Rater1	11/17 (65%)	11/11 (100%)	11/11 (100%)
Rater2	11/17 (65%)	11/11 (100%)	8/11 (73%)
Exercise 2			
Rater1	10/14 (71%)	8/10 (80%)	5/10 (50%)
Rater2	12/14 (86%)	9/12 (75%)	6/12 (50%)
Horizontal Exercise Mean	72%	89%	68%
Vertical (Command) Exercise			
Exercise 3			
Rater1	8/12 (67%)	8/8 (67%)	8/8 (67%)
Rater2	7/12 (58%)	7/7 (58%)	NA
Exercise 4			
Rater1	6/7 (86%)	6/6 (100%)	5/6 (83%)
Rater2	5/7 (71%)	5/5 (100%)	5/5 (100%)
Vertical Exercise Mean	71%	81%	83%
Total Mean	72%	85%	76%

Common Understanding. The Post-Event Survey consisted of four multiple-response items to assess each group's common understanding of their COA for the critical event just completed based on the scripted and free-play information exchanged during the event. For each survey item, "agreement" was calculated based on the highest number of participants selecting the same response. If four of five participants selected the same response option, the agreement number was 4. The agreement numbers were summed across the four items in each Post-Event Survey and divided by 20 (four items times five participants) to produce a percentage of agreement score for each event. Results on agreement by event and condition are shown in Table 3.

Table 3

Percentage of Agreement Between Participants on Common Understanding Items

Exercise	Common Understanding
Horizontal (Staff) Exercise	
Exercise 1	
Event 1	85%
Event 4	63%
Event 5	60%
Exercise 2	
Event 1	95%
Event 2	85%
Event 5	69%
Staff Exercise Mean	76%
Vertical (Command) Exercise	
Exercise 3	
Event 1	75%
Event 2	70%
Event 4	75%
Exercise 4	
Event 1	80%
Event 4	81%
Command Exercise Mean	76%
Total Mean	76%

Overall, the average agreement across events and experimental conditions was 76%. This finding provides some evidence that factual information and key group decisions were successfully shared through the collaborative activities during the event. The data also indicate that participants in the prototype Vertical (Command) condition performed as well as participants in the more traditional Horizontal (Staff) condition in developing a common understanding of their COA. Further refinement of measures on common understanding is ongoing and includes focusing on the free-play information exchanged during the Counteraction phase and assessing the accuracy of the participants' understanding of their COA.

Formative Evaluation Results

Final Survey Results. The Final Survey completed by each participant at the end of each group's wargaming session consisted of six True/False items, as indicated in Table 4, and several open-ended questions on the method and tools developed for distributed wargaming. Table 4 summarizes the True/False item results across the 20 participants; the complete results are contained in Appendix M.

Table 4

Summary results on formative evaluation of the research environment

Final Survey Item	Response	
	True	False
The Read-Ahead materials helped me prepare for the exercise.	18	1
The morning training session adequately prepared me to complete the exercise.	19	1
The certification drill at the beginning was very helpful for using the workstation.	20	0
I was able to use the workstation to access overlays and other information I needed to complete the exercise in a timely manner.	18	2
The background materials provided were sufficient for completing the exercise.	18	2
This method of wargaming could be used in actual operation (National Training Center (NTC), warfare, etc.).	17	3

Overall, between 90-100% of all participants endorsed the research environment with respect to the items assessed. All but one participant had read the materials in the Read-Ahead package, and those who had read the materials agreed that they were helpful in completing the exercise session. Ninety-five percent of participants agreed that the in-brief adequately prepared them for the exercise session and that the certification drill helped them use the workstation. On the other hand, several commented that additional time for the training session might have proved helpful. Ninety percent agreed that they were able to use the workstation to access overlays and other information in a timely manner. The two who disagreed cited the fact that the system crashed, or that it was too difficult to work with multiple overlays. Ninety percent agreed that the background materials provided were sufficient for completing the exercise, although the two dissenters indicated that they were insufficient or not detailed enough. A number of comments (see Appendix M) were provided indicating that the collaboration tools would need additional refinement. Of special interest, 85% of all participants reported the distributed wargaming methods developed were applicable to actual operational environments including field training centers and warfare.

Results for the open-ended formative evaluation items are presented in Appendix M. With regard to the question asking what additional tools would have made the wargaming process more effective, two participants mentioned that real-time file sharing and the ability to draw collaboratively would have been helpful. When asked what worked best about the wargaming process, several participants responded that the Collaborative Notepad worked well. When asked what the participant would change in the wargaming process, participants suggested there should be a better use of graphics. They suggested including better graphics themselves, better ways to change and share changes to the graphics, and the ability to animate the graphics to show the results of changes to a COA.

Electronic Performance Recordings. Analysis of videotaped recordings is a labor intensive effort not performed for this report, in part due to the preliminary nature of the research methods and the ad hoc nature of the participant groups. However, such recordings should automatically capture many key aspects of the wargaming process including the sequence of

behaviors supporting the exchange of verbal and written information as well as each participant's contribution to the wargaming exercise. Analysis of the electronic recordings will require a scoring taxonomy or framework to organize the observations into meaningful categories of behavior that support performance assessment goals. In the interim, ARI has conducted limited analyses on selected recordings, primarily entries made on the Collaborative Notepad, to refine methods for ongoing research on distributed wargaming. Future analyses of the recordings might support the development of behaviorally-based estimates of collaborative performance. For example, alternative approaches to rating collaborative performance might be compared based on observers' ratings of pre-recorded wargaming exercises.

Discussion

The present effort developed a research environment for distributed, simultaneous, and commander-centered planning for the Current and Future Force. The research environment was designed to overcome a number of shortcomings that often complicate command and control research to include excessive time requirements, unstructured exercises without adequate training objectives, and performance outcomes that are difficult to assess. Such environments are needed to replicate the tasks, conditions, and standards of performance for Future Force evaluation and training requirement.

The results reported are regarded as preliminary but promising indicators on the potential of the methods, materials, and measures developed for assessing distributed planning and wargaming in particular. The research approach was innovative in the design and development of structured and distributed wargaming exercises with built-in problem hooks to support measurement. Innovation extended to include not only conventional battalion staff wargaming but also multi-echelon wargaming among commanders at battalion and company echelons.

In this section, lessons learned are provided based on the results obtained, observations made, and the literature reviewed with respect to core components of the research environment. The three core components addressed below are structured exercises for more efficient wargaming, collaborative tools to support distributed planning, and measures of outcomes and process that can lead to more effective wargaming in distributed planning environments. These early lessons are provided as *formative,* not definitive, guidance for future efforts to explore and shape distributed operations.

Lessons Learned – Structured Exercises

The structured exercise approach appeared to be an efficient method to focus participant efforts directly on the free-play Counteraction phase essential to wargaming. The structured exercise format allows the embedding of problem hooks in the designated COA to support the measurement required to make wargaming research and training more effective.

Scripted and Free-Play Wargaming Phases. The structured design of the wargaming exercises and critical events was well received by the Active Duty participants. Design included scripted Action and Reaction phases of wargaming to compress wargaming preparation, to provide repeated opportunities for practice and feedback, and to focus on the primary objective

of wargaming – analyze and refine a COA. Free-play Counteraction targeted the human performance aspects of wargaming to stimulate ideas, highlight critical tasks, and provide insights otherwise difficult to achieve. A deliberate mix of scripted and free-play phases in exercise design is recommended to expedite distributed wargaming research. Key components of the structured exercise design included:

- Designated COA with embedded problems in key areas like BOS synchronization.
- Scripted Action and Reaction phases.
- Free-play Counteraction phase.
- Box Technique to focus wargaming on critical events.

Realistic Task Conditions. Design stressed setting realistic task conditions in the wargaming exercises. Notably, the operational setting and supporting materials appeared tactically sound and relevant to all of the Active Duty participants. Lessons learned and recommendations include:

- Provide a Contemporary Operational Environment (COE), particularly Azerbaijan setting against an asymmetric threat with multi-national organizations.
- Limit time to conduct wargaming to maintain operational tempo.
- Require participants to prioritize critical events for wargaming given the time available, a realistic expectation given the Future Force goal or more responsive planning.

Exercise Support Package. To support and expedite distributed wargaming, a structured and relatively comprehensive Exercise Support Package (ESP) was developed. The ESP was comprised of the Read-Ahead, In-Brief, Training/Certification materials, and the Execution Guide. The ESP was generally well received by the participants with 90-100% reporting the key components of the ESP were acceptable. However, the participants and research team identified shortcomings in the training and job aids needed, in large part to overcome the less than user-friendly nature of the collaborative tools used.

As a result of the research, distributed wargaming ESPs for the Current Force and the Future Force are documented and available from ARI for adoption and/or adaptation in related exercise development efforts. Appendix C provides the Read Me file from the compact disc available from ARI to more precisely indicate the materials and exercise structure included in the Distributed Wargaming ESP. The Future Force ESPs although only partially developed, provide a transfer template for future evaluation and training efforts. The Current Force ESPs used by participants in Horizontal and Vertical conditions were:

- Described and partially documented in this report.
- Fully documented and available from ARI on a compact disc.
- Distributed to the Armor School for consideration in the Armor Captain's Career Course (Distance Learning) at Fort Knox.

Horizontal and Vertical Exercises. Exercise design included an attempt to transform the traditional Horizontal (Staff) wargaming process to a Vertical (Command) process anticipated

for Future Force wargaming. As expected, there appeared to be several major differences between the Horizontal and Vertical conditions. Overall, participants in the Horizontal condition seemed to proceed with less difficulty, probably because this condition is more typical of the way wargaming is currently performed.

In contrast, some participants in the Vertical condition had difficulty adjusting to the concept and process of commander-centered wargaming. Lessons learned and recommendations for vertical wargaming include:

- Participants in the Vertical condition reported that rarely would subordinate commanders have the opportunity to participate in wargaming.
- Participants in the Vertical condition stated commander-centered wargaming seemed more like mission rehearsal.
- Individual differences in wargaming experience undoubtedly affect performance. Future research might use background information, from demographic surveys for example, to assign participants to duty positions and roles.

In sum, the findings underscore the need for more research and training to facilitate the Army's move toward commander-centered wargaming across echelons to meet Future Force objectives for distributed operations.

Lessons Learned – Collaborative Tools

Overall, the participants considered the collaborative tools to be useful. However, technical shortcomings and a not-so-friendly user-interface limited participants' efforts to understand and apply the collaborative tools as effectively as desired. The complexity of the tools also complicated researchers' efforts to develop training and job aids for tool use. The intent of this section is to provide lessons learned and recommendations on the tool *capabilities* required for distributed operations. The actual tools used by the participants for distributed wargaming are representative of current capabilities, but not state-of-the-art or future capabilities. Efforts to improve tool capability should attend to user-based requirements and issues, including those identified by the wargaming participants. Efforts to improve wargaming should attend to current and foreseeable limitations in tool capability.

Whiteboard Tool. The animated Whiteboard tool was used to provide a dynamic visual medium for distributed collaboration. However, the Whiteboard tool obtained from the Unit of Action Maneuver Battle Lab was *not* user-friendly. This Whiteboard was selected because it was compatible with the Army's virtual simulation program and because it provided participants access to terrain-registered overlays and graphic control measures. Unfortunately, procedures for using Whiteboards are relatively complex for users and training development. Numerous times the wargaming exercises were disrupted and delayed by Whiteboard technical difficulties, particularly when transitioning between critical events. These difficulties forced the research team to limit the Whiteboard's link to simulation for the wargaming exercises to avoid technical delays and risk.

Only abbreviated training on the Whiteboard was provided to the participants in an effort to minimize their training burden and expedite their wargaming activity. However, the training

provided may not have adequately reduced the complexity of using the Whiteboard. Training can relieve design problems, but such training imposes a heavy burden on users and training development resources. A good example of such training is a set of Whiteboard "drills" developed to help military users start and conduct distributed conferences (Deatz, Green, Holden, Throne, & Lickteig, 2000). Lessons learned and recommendations on Whiteboards include:

- "Drills" for training Whiteboard-based conference sessions may be needed to expedite the start and conduct of collaborative sessions. This need should be based on a review of Whiteboard tools and procedures in current and prototype C^2 systems and commercial software.
- An effective Telestrator tool is needed to help participants guide and track distributed visual collaborations on the Whiteboard.
- Whiteboards that are not terrain-registered require participants to re-generate graphic overlays and drawings, a form of "swivel-chair integration" that costs time and resources when humans serve as copy machines.
- Whiteboards that are not simulation compatible limit the ability of participants to obtain objective simulation-based feedback on the feasibility of the proposed COA and the participants' modifications to the COA.

Collaborative Notepad. The Collaborative Notepad allowed participants to record wargaming changes by duty position and BOS. In many ways the Notepad appeared adequate for recording textual changes to the COA and requesting additional information and support. It also allowed the commander or executive officer to delegate the recording task to either one participant, or to share the recording task among participants. Participants in the Horizontal condition appeared more inclined to use the Notepad, perhaps because its BOS format more closely aligned to staff duty positions.

Notably, participants in the Vertical (Command) condition *verbalized* as many BOS synchronization issues and changes as the Horizontal (Staff) participants, but they did not record as many in the Collaborative Notepad. Perhaps, the reason Vertical (Command) participants were not as conscientious about recording wargaming changes on the Collaborative Notepad is that commanders are less accustomed to this "secretarial" requirement. Another reason may be that exercise design and training may not have adequately stressed that their Notepad entries were being notionally received and acted on by surrogate personnel. In sum, recommendations to improve the Collaborative Notepad are provided below with an emphasis on ensuring changes to the COA are adequately documented:

- Stress to the participants that the Notepad extends beyond the immediate wargaming audience or primary participants. To reinforce this point, one or more surrogate participants might respond to participant requests for information or support.
- Modify the Notepad interface to better ensure changes made to the COA are recorded.
- Use the Whiteboard's pictorial and graphic capabilities to visually record changes to the COA, to complement the Notepad's textual changes.
- Examine the utility of adding a voice recognition capability to the wargaming environment to minimize the requirement for note taking.

Standing Operating Procedures. Collaboration, like any form of collective performance, generally benefits from Standing Operating Procedures (SOPs) (Graves et al., 2004). One example is the earlier recommendation for Whiteboard "drills" based on SOPs to train the often exacting procedures required to start and conduct collaborative sessions. A key example is the need for SOPs on *display management* to ensure a common view for visual collaboration. All the participants had a common operational picture *available* somewhere on their C^2 displays. However, participants were required to repeatedly adjust their displays to maintain a common *view* of the battlefield as the wargaming discussions shifted the locus of attention within and across events.

The wargaming products developed for this effort included an SOP to help participants uniformly adjust their C^2 displays as the terrain focus shifted during wargaming discussions. The display management SOP entailed three scripted parts of information verbally conveyed by the participant who directed the shift in visual focus: map scale, map center, and overlays required. Despite the use of the SOP, some participants still struggled to manage their display and stated, "say again" for a repeat of the display specifications. In sum, the lessons learned include:

- The SOPs are strongly recommended to facilitate distributed operations. An SOP for display management and collaboration is proposed that verbally specifies map scale, map center, and overlays required.
- Visual collaboration often requires a common view. To facilitate distributed operations, C^2 systems should be able to automatically generate a common view across participants to include map scale, map center, and overlays required.
- Future research should determine if display management is an important but unmet requirement in the design and development of C^2 systems.
- Future research should examine more automated procedures for display management in support of distributed operations.

Job Aids. Overall, the job aids and training guides appeared useful to the Active Duty participants. The graphic detail provided by these job aids for understanding and applying technology is an important component of an effective ESP. Shortcomings in these job aids centered primarily on the recurrent problem of providing a belated "training fix" to overcome problems in human-centered design.

Lessons Learned – Measurement

Measures of performance were developed to assess the outcomes of wargaming. The outcome measures assessed the actual changes made or requested to the COA as well as the participants' common understanding of key scripted and free-play information about their COA. Discussion also addresses briefly the need for more objective and comprehensive measures on the process of wargaming.

Outcome Measures. The outcome measures appear to have captured objective data directly relevant to some key wargaming objectives, namely BOS Synchronization and common understanding of the group's COA. The BOS Synchronization Rating Form assessed how well

participants addressed synchronization issues embedded in the designated COA during wargaming. Given the relatively high level of observer agreement on BOS synchronization, the method may yield relatively reliable estimates of wargaming outcomes in future efforts with intact groups and participants more experienced in wargaming. However, the measurement approach needs refinement to help the rater assess whether the COA changes made equate to successful solutions for the embedded BOS synchronization problem.

The Post-Event Survey assessed the ability of the group to develop a common understanding of the information exchanged during the wargaming and changes made to the COA. Results indicated participants obtained a common understanding on many scripted and free-play aspects of their COA, such as position and re-position of friendly forces and adjustment to fire support plans. Further refinement of the common understanding measurement methods are ongoing and include expanding the focus on free-play information exchanged during counteraction and assessing the accuracy of the participants' understanding of their COA.

Overall, the measures developed on BOS synchronization and the group's common understanding are examples for obtaining more objective data on wargaming outcomes. Such data is difficult to obtain on higher-order skills and it is often a neglected component in wargaming. For both of these measures administration costs were minimal. Recommendations to improve these two outcome measures include:

- The BOS Synchronization Rating Form measure could be improved by including guidelines for what constitutes "group" discussion, and criteria for judging the "goodness" of COA change recommendations.
- Measures related to common understanding could be improved by expanding the measure's focus on the free-play information exchanged during counteraction and assessing the accuracy of the participants' understanding of their COA.

Process Measures. Unfortunately, little direct data on the process of wargaming was analyzed for this report. However, electronic recordings were made of participant performance during all exercises and events, including the Collaborative Notepad text entries used to make and request changes to the COA. Future analyses of the recordings might support the development of behaviorally-based estimates of collaborative performance. For example, alternative approaches to rating collaborative performance might be compared based on observers' ratings of pre-recorded wargaming exercises.

In hindsight, data obtained on the BOS synchronization issues that were identified and discussed might be categorized as wargaming process measures. The observer ratings were based on observable participant behaviors that relate to the process of sharing information and collaborating. Recommendations to develop and refine wargaming process measures include:

- Identify group members responsible for the observed actions and discussion.
- Develop a measurement framework on the process of wargaming that assesses the frequency and types of information exchanged during wargaming.

Conclusions on Measurement. A primary lesson learned is that the investment made in structured exercises is returned in measurement gain. Development of the BOS synchronization measure required that researchers proactively create and embed hooks and triggering events into the wargaming exercise, as indicated in Figure 12. Similarly, the measure of participants' common understanding required that researchers anticipate and develop multiple-choice questionnaire items that assessed key information from scripted and free play phases of the wargaming exercise.

Overall, the wargaming outcome and formative evaluation measures developed provide a limited but potentially powerful set of assessment tools to assess and *improve* distributed wargaming performance. An obvious, but often overlooked, recommendation is that future efforts maintain a complementary focus on both the process and outcomes of wargaming. Ongoing work by ARI is focused on combining theory, technology and the lessons learned to develop more reliable and valid measures of human performance for distributed planning and operations.

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Appendix A

Acronyms

ADA	Air Defense Artillery
AFRU	Armored Forces Research Unit
ARI	U.S. Army Research Institute for the Behavioral and Social Sciences
AO	Area of Operations
AVLB	Armored Vehicle Launched Bridge
BCP	Build and Sustain Combat Power
Bn	Battalion
BOS	Battlefield Operating System
BRT	Brigade Reconnaissance Team
C^2	Command and Control
C^4ISR	Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance
CAB	Combined Arms Battalion
CAS	Close Air Support
CASEVAC	Casualty Evacuation
CAV	Cavalry
CDR	Commander
Chem	Chemical Officer
CMD	Command
Co	Company
COA	Course of Action
COE	Contemporary Operational Environment
COP	Common Operational Picture
CP	Command Post
CROP	Common Relevant Operational Picture
CSM	Command Sergeant Major
CSS	Combat Service Support
DA	Department of the Army
DOTMLPF	Doctrine, Organizations, Training, Materiel, Leadership and Education, Personnel, and Facilities
DS	Direct Support
ECOA	Enemy Course of Action
ENG	Engineer
ESP	Exercise Support Package
FBC	Future Battlefield Conditions
FBCB2	Force XXI Battle Command Brigade and Below
FCS	Future Combat Systems

FE	Fires and Effects
FM	Field Manual
FS	Fire Support
FSO	Fire Support Officer
FWD	Forward
HR	Human Resources
ID	Identify
IFV	Infantry Fighting Vehicle
IN	Infantry
Intel	Intelligence Officer
IPB	Information Preparation of the Battlefield
ISR	Intelligence, Surveillance, and Reconnaissance
LD	Line of Departure
LOC	Line of Contact
MCS	Mounted Combat System
MDMP	Military Decision Making Process
Mech	Mechanized
METT-TC	Mission, Enemy, Terrain, Troops, Time and Civilian
MODP	Multi-Echelon Operations for Distributed Planning
MRTR	Mortar
MS	Maneuver Support
NAI	Named Area of Interest
NGO	Non-Governmental Organization
NLOS	Non-line of Sight
NTC	National Training Center
OBJ	Objective
OneSAF	One Semi-Automated Force
O&O	Operational and Organizational
OPS	Operations
OTB	OneSAF Test Bed
PL	Phase Line
PLT	Platoon
PLT LDRS	Platoon Leaders
PVD	Plan View Display
Recon	Reconnaissance
RFI	Request for Information
RPG	Rocket Propelled Grenade
S1	Personnel Officer

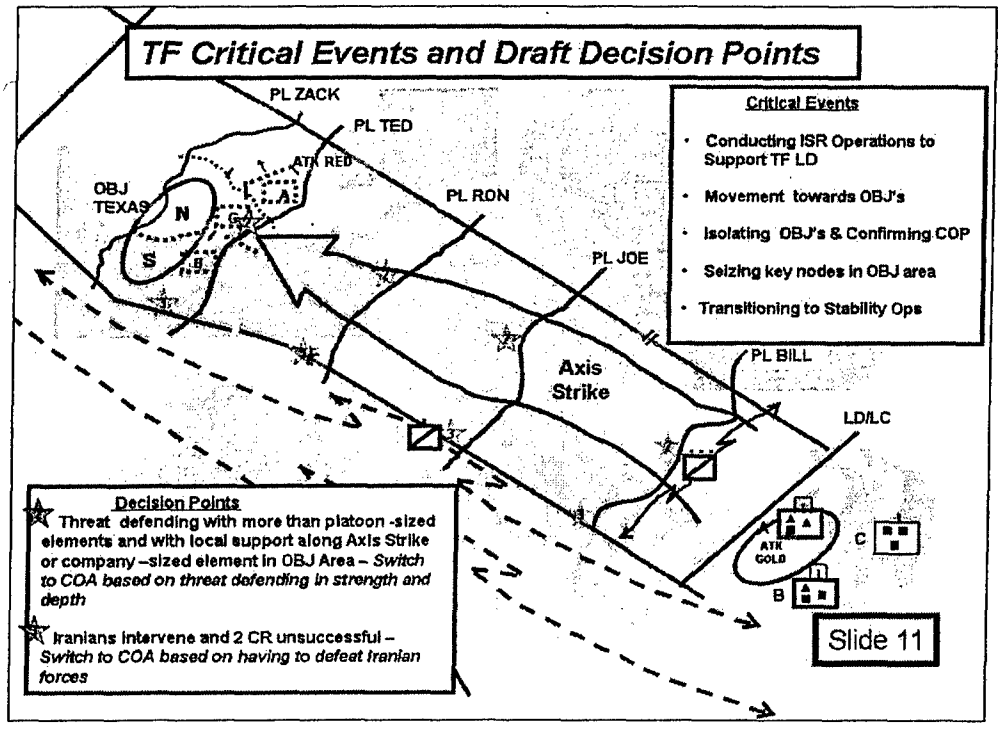
S2	Intelligence Officer
S3	Operations Officer
S4	Logistics Officer
SC^4	Surrogate Command Control Communications and Computers
SCT	Scout
SIG	Signal Officer
SOF	Special Operations Forces
SOP	Standing Operating Procedures
SPT	Support
STO	Science and Technology Objective
TF	Task Force
TI	Tactical Intranet
TM	Team
T/O	Trainer/Observers
TRP	Target Reference Point
TTP	Tactics, Techniques and Procedures
UA	Unit of Action
UAMBL	Unit of Action Maneuver Battle Lab
USAF	United States Air Force
XO	Executive Officer

Appendix B

Sample Participant Preparation Materials: Horizontal (Staff) Exercise

Multi-Echelon Operations for Distributed Planning
Task Force Staff Wargaming

23 Jan 04



Agenda

0800 - 0900

- Exercise Overview - 15 min
  - *Why, Who, What, For How Long, and Setting the Stage for the Wargame*
- First Three Steps of the Distributed Wargame Process – 45 min
  - *Step 1: Wargame Preparations and Training*
  - *Step 2: XO/CDR directs Situation/COA Update*
  - *Step 3: XO/CDR prioritizes critical events*

0900 - 1200 – Staff wargames the critical events of designated COA against one Threat COA

First Hour Preparation

"Why and What"

Why are you here

- To be role players in tactical exercises designed to support research in collaborative, distributed planning and wargaming.
- To help "drag the noodle" towards development of doctrine and TTP for current and future distributed operations
- To improve your staff skills & to have some fun doing it

What is expected of you

- To step into the Military Decision Making Process - at the COA Analysis Step - and wargame one Friendly COA against one Threat COA while serving as a Bn Task Force primary staff officer and BOS representative.
- To get into character – all your prep briefings have been put together for you – you need to initially buy into them – and change them as per the wargaming results.
- To develop fixes and recommendations to the COA

Multi-Echelon Operations for Distributed Planning (MODP)

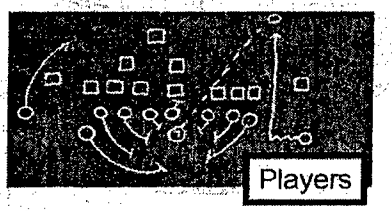
Research Method

- Wargame five current/future Battalion-level COA events using "box" technique for critical events.
- Drive wargaming in a simultaneous, distributed, collaborative, and multi-echelon manner in a networked environment.
- Use the following tools and methods:
  - COP display
  - Animated whiteboard
  - Voice communications
- Develop distributed wargaming methods

The MODP Team

"Who's in the Huddle"

Head Coaches (ARI)
Dr. Carl Lickteig
Mr. Bill Sanders



Players

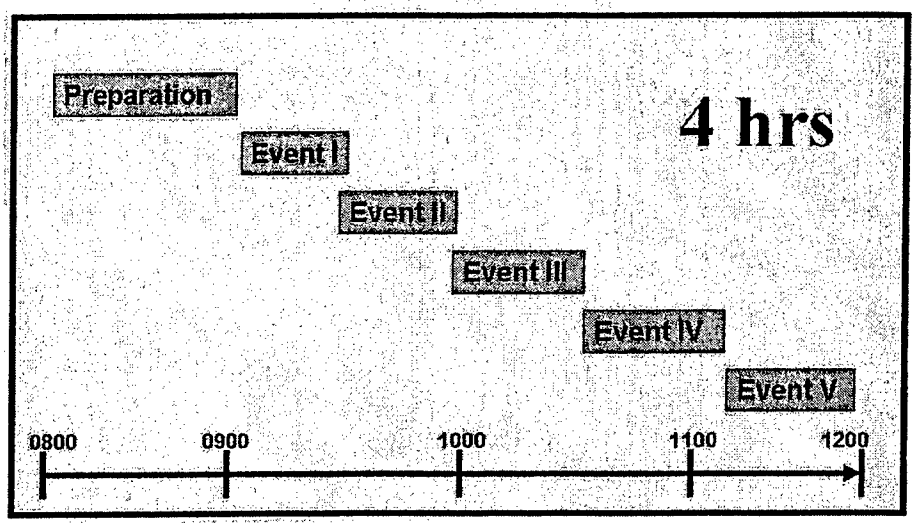
Offensive Coordinator, Special Teams, and Position Coaches (HumRRO and NG Team)

Matt Smith
Chuck Heiden
John the Trainer
Bill Holden
Clair Conzelman

Dr. Bob Gossman
Ms. Charlotte Campbell
Ms. Rebecca Mauzy
Paul on the Computers

Exercise Overview

" For How Long"



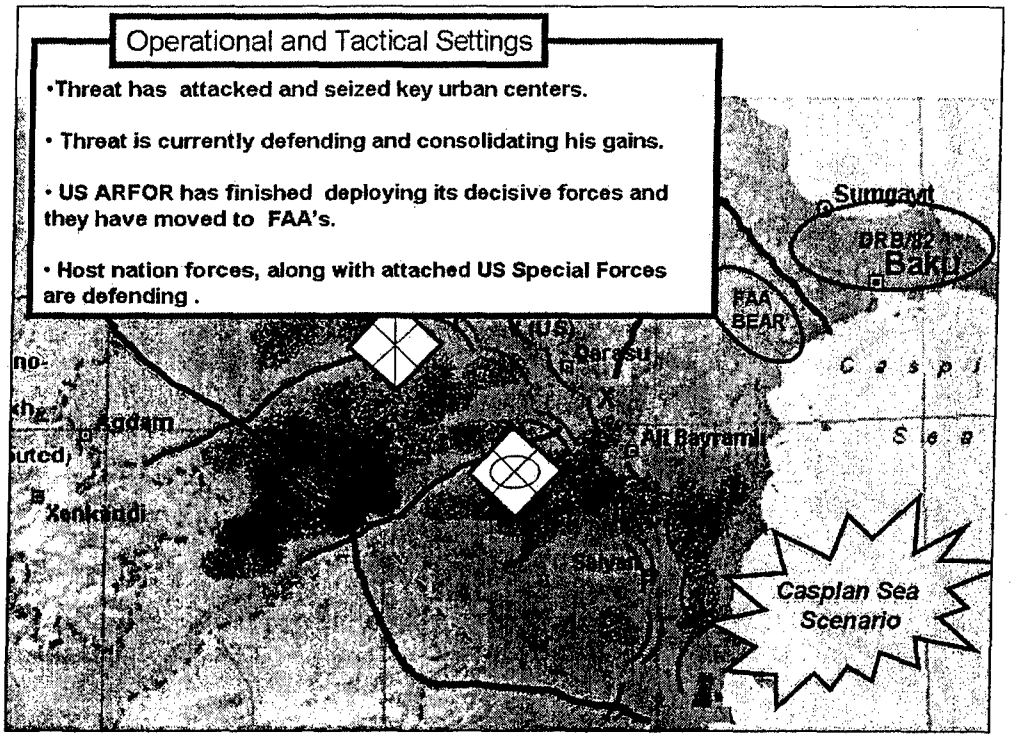
Setting the Stage for the Exercise

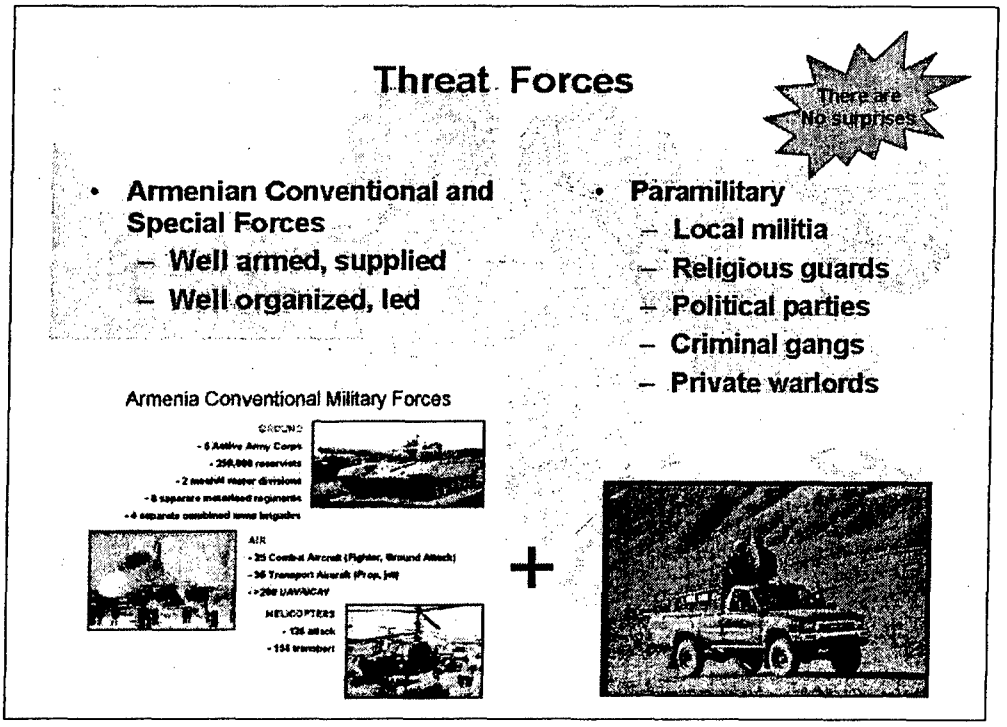
"Operational & Tactical Settings"

- *You are a member of a Bn TF battle staff participating in a collaborative distributed wargame in preparation for the TF's next mission.*
- *Your TF is currently deployed in forward AA's in Azerbaijan preparing for movement and operations.*
- *Your BCT Cdr has approved a BCT COA and has shared it. The BCT is also developing two contingency branches to their COA: (1) based on the threat defending in strength and depth and (2) based on Iranian intervention.*

TF Cdr's Directions:

- *Based on the BCT COA, my talks with the BCT Cdr, and the results of the hasty mission analysis that the TF XO led you through, I have approved the restated mission, developed my planning guidance, my intent, my initial CCIR, and a rough draft COA.*
- *While I am away at the ARFOR rehearsal, I want the TF XO and my staff to wargame the draft COA, get the BOS's in line, buy into it, or recommend changes.*
- *Time is short, so wargame only this COA against the Threat's most likely actions. If time permits develop TF branches to support BCT branches to COA.*
- *Remember, don't tell me what I can't do, but what we have to do to accomplish the mission.*

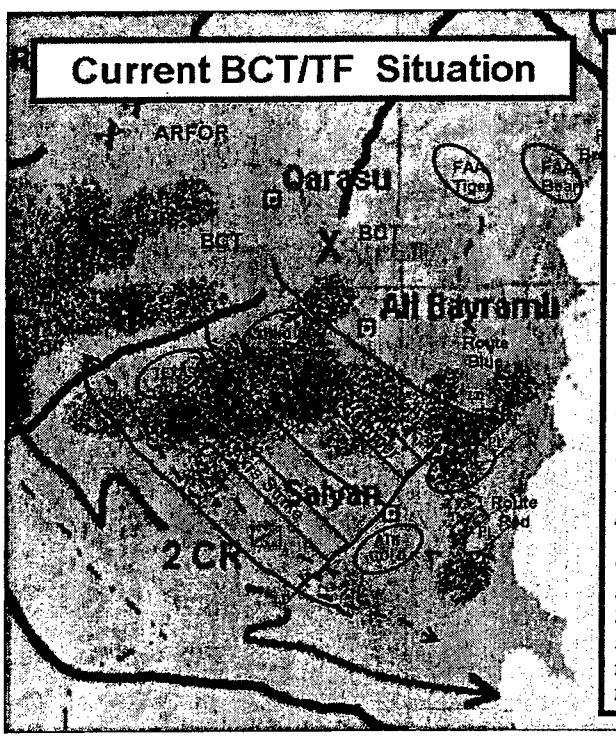

Operational and Tactical Settings
•Threat has attacked and seized key urban centers.
• Threat is currently defending and consolidating his gains.
• US ARFOR has finished deploying its decisive forces and they have moved to FAA's.
• Host nation forces, along with attached US Special Forces are defending .
Sumgayit
Baku
FAA
BEAR
Caspian Sea
Scenario


Threat Forces
There are No surprises
• Armenian Conventional and Special Forces
– Well armed, supplied
– Well organized, led
• Paramilitary
– Local militia
– Religious guards
– Political parties
– Criminal gangs
– Private warlords
Armenia Conventional Military Forces

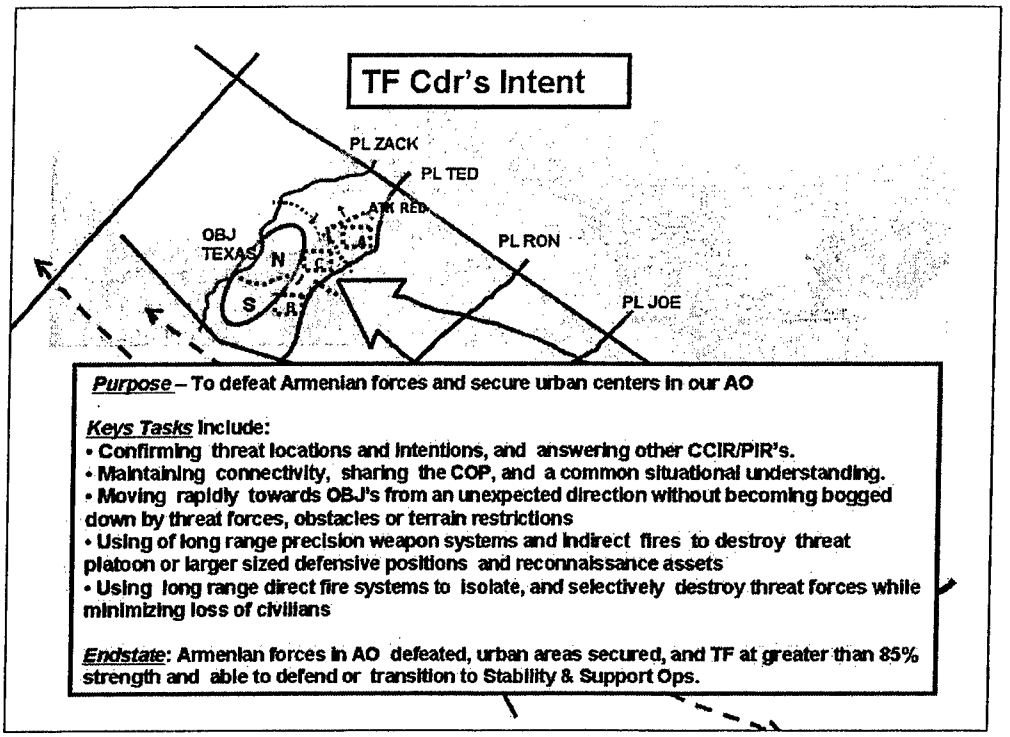
Other Players
"Organizations & Agencies"

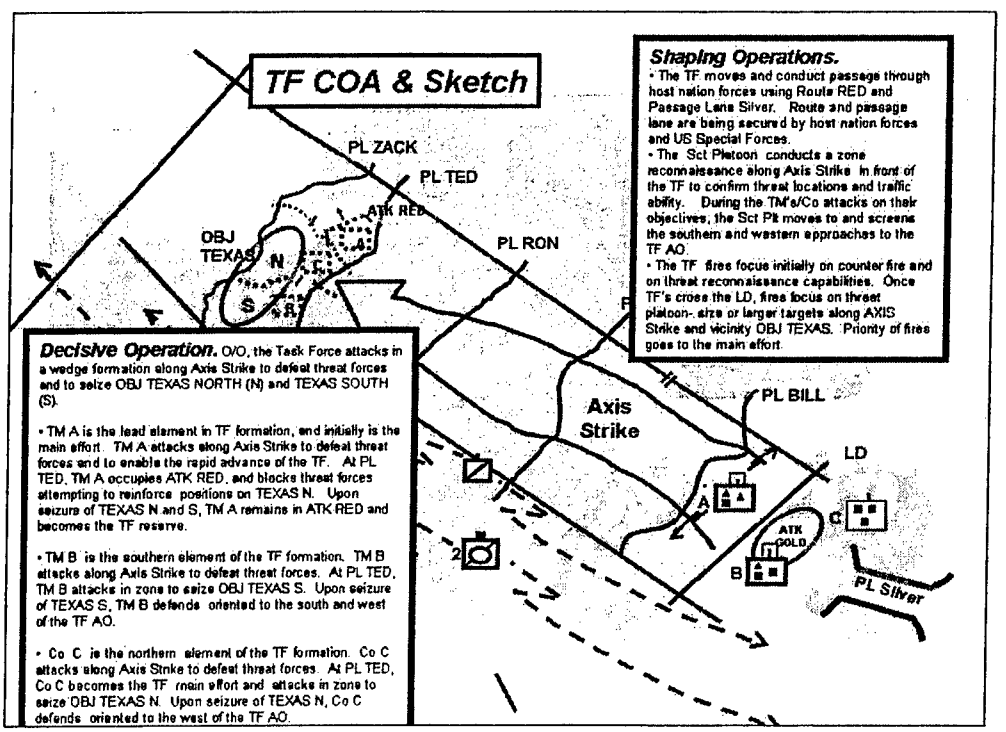
- Refugee camp in Mazerli (OBJ area)
- Red Cross/Red Crescent
  - Hospital in Mazerli
- UN Food Aid
  - Distribution point in Mazerli
- Doctors Without Borders (office in Imishli)
- Various missionary groups
- World wide Media

Current BCT/TF Situation



- *Both the BCT and the TF is currently deployed to Forward Assembly Area in Azerbaijan planning and preparing for movement and operations.*
- *It is now H-24 hours (2300 hrs local) . H-hour is the time the Task Force main body will cross the LD.*
- *Task Force is tank heavy.*
- *No combat support units attached nor in direct support*
- *We received our digital C2 systems (FBCB2, MCS, ASAS ...) prior to deployment.*
- *During our operation. We will have the BCT's Recon Troop and 2nd Cavalry Regiment on our southern flank and another TF from the BCT on our northern flank.*


TF Cdr's Intent
PL ZACK
PL TED
ATK RED
OBJ TEXAS
N
S
PL RON
PL JOE
Purpose – To defeat Armenian forces and secure urban centers in our AO
Keys Tasks include:
• Confirming threat locations and intentions, and answering other CCIR/PIR's.
• Maintaining connectivity, sharing the COP, and a common situational understanding.
• Moving rapidly towards OBJ's from an unexpected direction without becoming bogged down by threat forces, obstacles or terrain restrictions
• Using of long range precision weapon systems and indirect fires to destroy threat platoon or larger sized defensive positions and reconnaissance assets
• Using long range direct fire systems to isolate, and selectively destroy threat forces while minimizing loss of civilians
Endstate: Armenian forces in AO defeated, urban areas secured, and TF at greater than 85% strength and able to defend or transition to Stability & Support Ops.


TF COA & Sketch
PL ZACK
PL TED
ATK RED
OBJ TEXAS
N
S
PL RON
Shaping Operations.
• The TF moves and conduct passage through host nation forces using Route RED and Passage Lane Silver. Route and passage lane are being secured by host nation forces and US Special Forces.
• The Sct Platoon conducts a zone reconnaissance along Axis Strike in front of the TF to confirm threat locations and traffic ability. During the TM's/Co attacks on their objectives, the Sct Plt moves to and screens the southern and western approaches to the TF AO.
• The TF fires focus initially on counter fire and on threat reconnaissance capabilities. Once TF's cross the LD, fires focus on threat platoon- size or larger targets along AXIS Strike and vicinity OBJ TEXAS. Priority of fires goes to the main effort.
Decisive Operation. O/O, the Task Force attacks in a wedge formation along Axis Strike to defeat threat forces and to seize OBJ TEXAS NORTH (N) and TEXAS SOUTH (S).
• TM A is the lead element in TF formation, and initially is the main effort. TM A attacks along Axis Strike to defeat threat forces and to enable the rapid advance of the TF. At PL TED, TM A occupies ATK RED, and blocks threat forces attempting to reinforce positions on TEXAS N. Upon seizure of TEXAS N and S, TM A remains in ATK RED and becomes the TF reserve.
• TM B is the southern element of the TF formation. TM B attacks along Axis Strike to defeat threat forces. At PL TED, TM B attacks in zone to seize OBJ TEXAS S. Upon seizure of TEXAS S, TM B defends oriented to the south and west of the TF AO.
• Co C is the northern element of the TF formation. Co C attacks along Axis Strike to defeat threat forces. At PL TED, Co C becomes the TF main effort and attacks in zone to seize OBJ TEXAS N. Upon seizure of TEXAS N, Co C defends oriented to the west of the TF AO.
Axis Strike
PL BILL
LD
ATK GOLD
PL Silver
A
B
C
2

Distributed Wargaming Training
"Step 1 of the Wargame - Preparation and Training"

Step 1: XO/CDR and staff ensures Wargame Prep Complete
- Review wargame materials
- ***Ensure players are trained/ready to conduct distributed wargame (practice and certified)***
- Confirms digital connectivity (share[illegible], electronic maps…)
- Confirms FM communications

- Distributed Wargame Primer
- Hands on Training with distributed wargaming tools

Distributed Wargaming Training
"Step 1 Training"

Distributed Wargame Primer
- Wargame Definition
- Wargaming TTP
  - ✓ Steps
  - ✓ Sequence
  - ✓ Rules
  - ✓ Tools
  - ✓ Responsibilities
  - ✓ Results

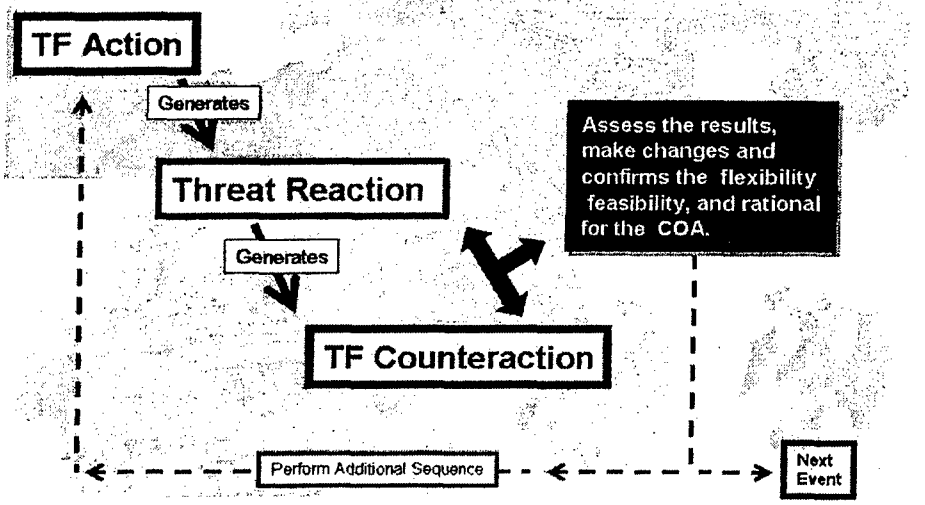
Wargaming Definition

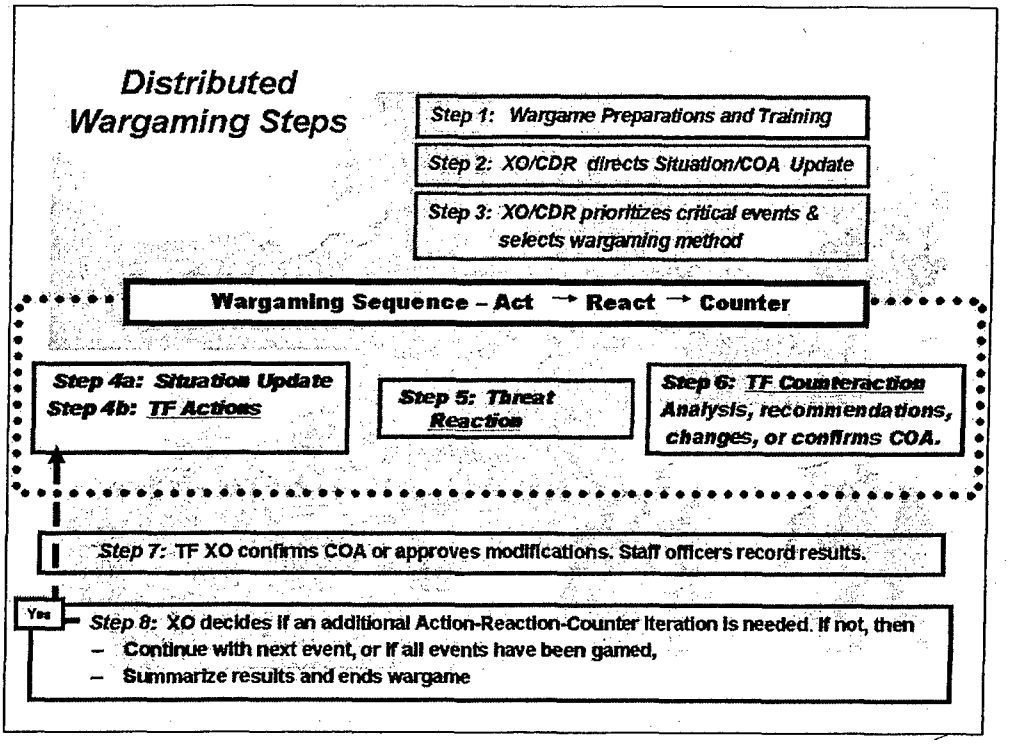
Wargaming attempts to visualize the flow of an operation, given friendly and threat dispositions, probable COAs, and a given battlefield environment. It attempts to foresee the action, reaction, and counteraction dynamics of operations.

It begins the development of a detailed plan. As a result, the staff—

- Develops a shared vision of the operation.
- ***Anticipates events– identifies unforeseen events, tasks, requirements, or problems – and staff members recommend modifications to resolve unforeseen events/tasks/problems.***
- Determines the conditions and resources required for success.
- Identifies a COA's strengths and weaknesses.
- Identifies the coordination requirements to produce synchronized results.
- Determines decision points.
- Determines information required to plan and execute the COA.
- Identifies branches and sequels for further planning.

Wargaming Sequence





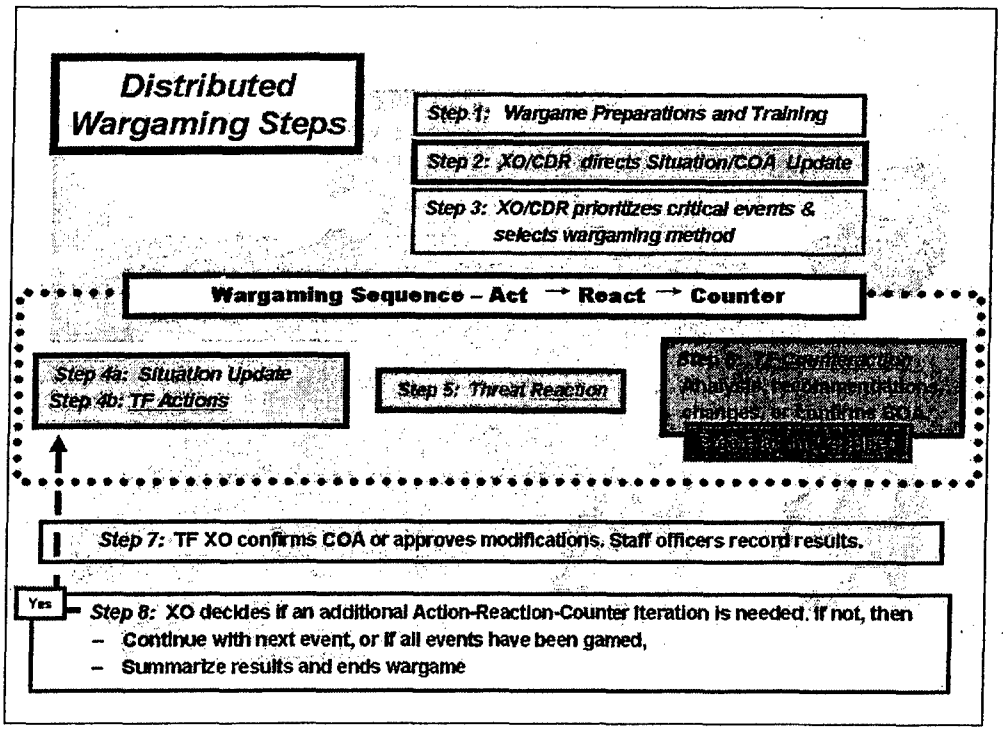
Key Wargaming Rules

- Determine time available
- Prioritize critical events
- Wargame critical events by BOS/maneuver element
- Wargame against the threat's most likely COA, if time permits others
- Conduct TF Action– Threat Reaction– TF Counteraction Sequence
- Fight the threat, not the plan
- Record/share results, confirm the COA, or modify the COA as required

Distributed Wargaming Tools

- Guidance from TF Cdr and higher
- Shared Map/COP
- FM communications, e-mail, and chat
- John Madden "white board" capabilities
- Shared COA Sketch and Statement
- Recording and sharing method

Execution Guides:
- *Scripted briefings through Step 5 of the wargame*
- *A wargaming sequence and means of control*



Wargaming Players' Responsibilities

- Brief, fight and coordinate your BOS
- Confirm COA for each event or make recommendation to fix "problems and issues".
- Maintain overlays, prepare sketches
- Capture data -- COA advantages, disadvantages, specified and coordinating tasks, and problems/issues
- Update CCIR/PIR

Wargaming Results & Products

Refine the COA to ensure it is:

✓Feasible:
- Meets commander's intent
- Provides clear task & purpose to all subordinate elements
- Provides enough detail to permit synchronization of unit combat power

✓Flexible -- provides agility and versatility to respond to an uncooperative enemy or changing conditions

✓Reasonable -- provides sufficient time for subordinate troop leading procedures down to the lowest level

Distributed Wargaming Training

"Step 1 Training"

Step 1: XO/CDR and staff ensures Wargame Prep Complete

- **Review wargame materials**
- ***Ensure players are trained/ready to conduct distributed wargame (practice and certified)***
- **Confirms digital connectivity (share[illegible], electronic maps…)**
- **Confirms FM communications**

Hands on Training with Distributed Wargaming Tools

- One on one training with TOC's
- Taught more than "switchology"…. how tool *can be* used in wargame

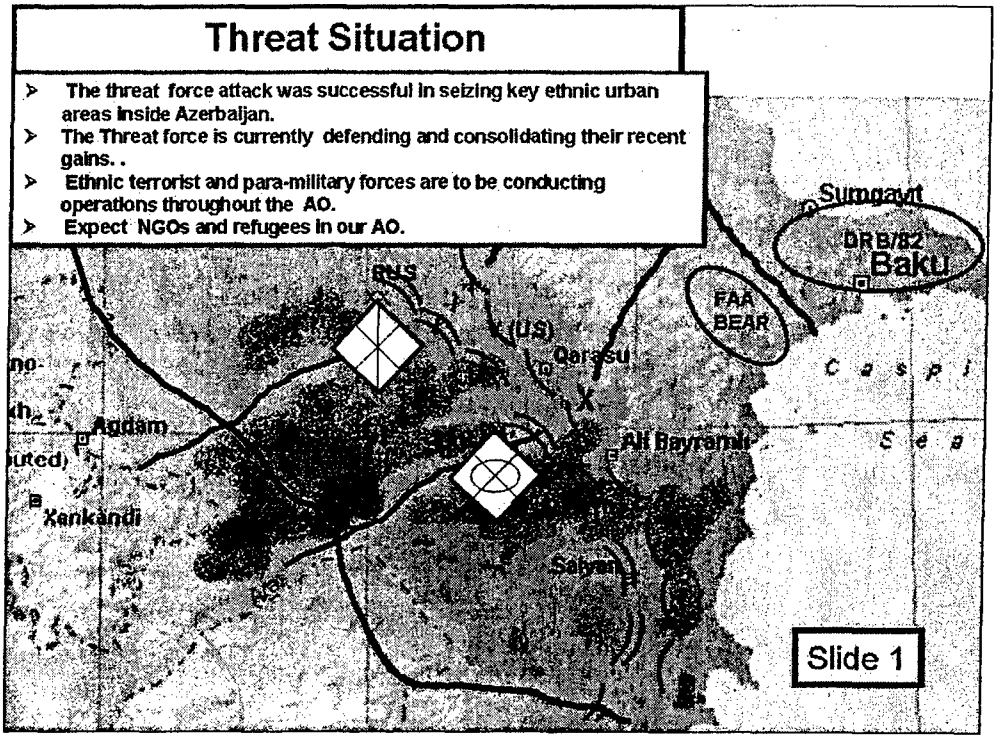
TF Staff Update Briefing

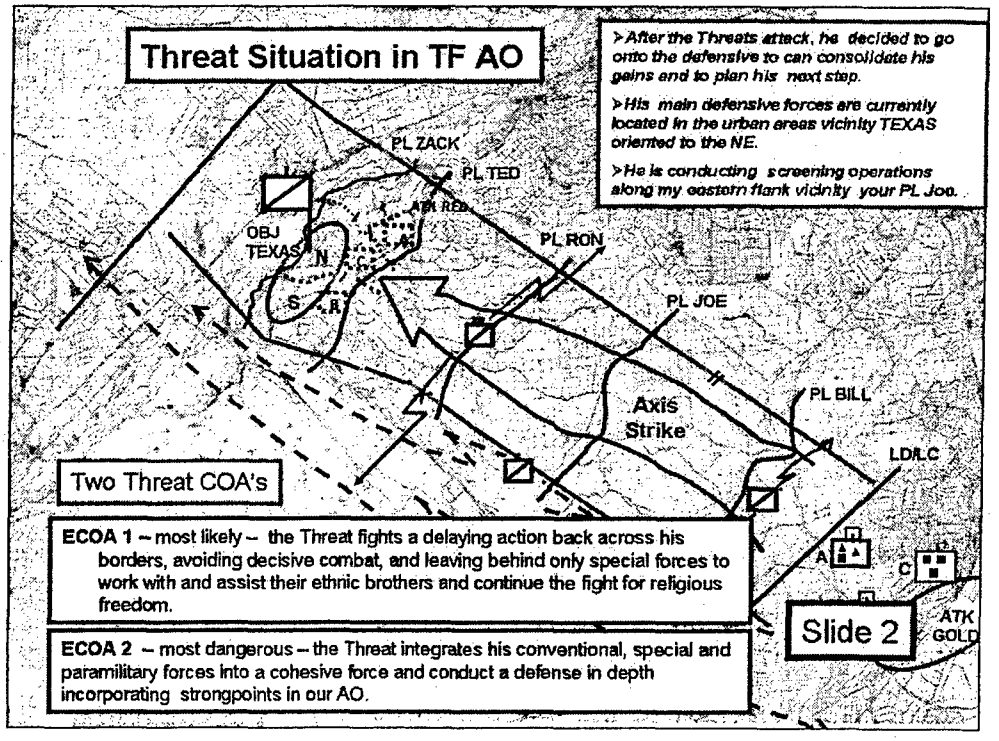
"Step 2 TF Update"

Step 2: Situation/COA Update – TF conduct Update (Distributed Briefing)

- **Threat Situation** (Recent actions, activities and current disposition) (S2)
- **Friendly situation** (BCT/TF disposition, BCT Cdr Intent, and BCT COA) (S3)
- **TF Planning** (Assumptions, Cdr Intent, COA sketch/statement, Critical Events) (S3)

Slide 26 – 33 will be used by TF Staff during their Distributed Staff Update. Slide will be loaded on a common file


Threat Situation
The threat force attack was successful in seizing key ethnic urban areas inside Azerbaijan.
The Threat force is currently defending and consolidating their recent gains. .
Ethnic terrorist and para-military forces are to be conducting operations throughout the AO.
Expect NGOs and refugees in our AO.
Sumgayit
DRB/82
Baku
FAA
BEAR
RUS
(US)
Qarasu
Agdam
Ali Bayramli
Xankandi
Salyan
Slide 1

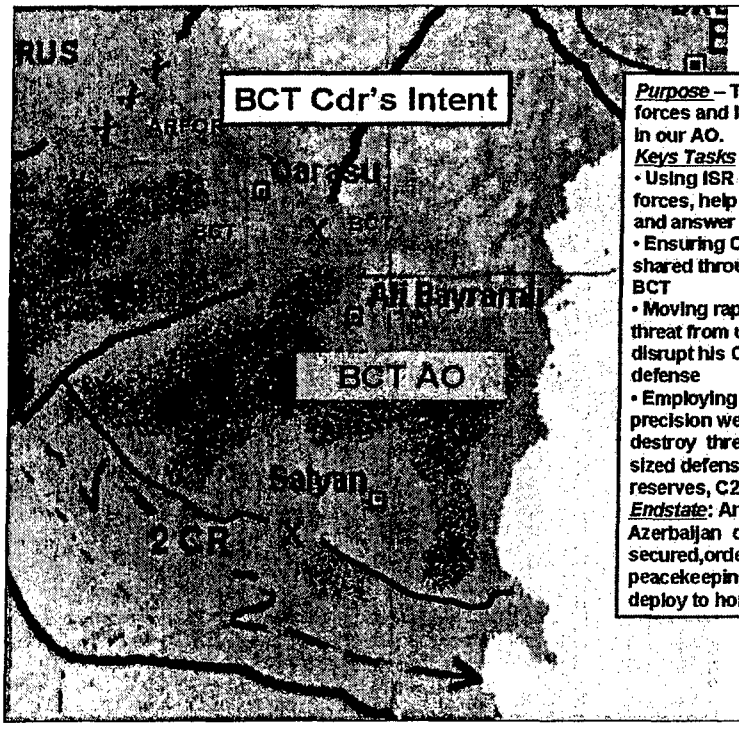

Threat Situation in TF AO
After the Threats attack, he decided to go onto the defensive to can consolidate his gains and to plan his next step.
His main defensive forces are currently located in the urban areas vicinity TEXAS oriented to the NE.
He is conducting screening operations along my eastern flank vicinity your PL Joe.
PL ZACK
PL TED
ATK RED
OBJ TEXAS
PL RON
PL JOE
Axis Strike
PL BILL
LD/LC
Two Threat COA's
ECOA 1 – most likely – the Threat fights a delaying action back across his borders, avoiding decisive combat, and leaving behind only special forces to work with and assist their ethnic brothers and continue the fight for religious freedom.
ECOA 2 – most dangerous – the Threat integrates his conventional, special and paramilitary forces into a cohesive force and conduct a defense in depth incorporating strongpoints in our AO.
Slide 2
ATK GOLD

Planning Assumptions

Shaped out by the BCT S3 Planner

- Armenian forces will execute their most likely COA – Delay back across the border, extending the conflict over time, avoiding decisive combat, and inflicting as many US casualties as possible.
- Ethnic paramilitary forces are not well trained or organized, and lack the ability to conduct operations above squad-level.
- Host nation civilians along/inside Axis Strike will not organize to violently oppose the TF advance or sustainment.
- Iranian forces will not intervene on behalf of the ethnic uprising or in support of Armenian forces.
- The 2nd C will be successful in moving to and conducting operations to cover the ARFOR southern flank
- The TF in the north will be successful and will prevent Armenian forces from moving south and reinforcing Armenian forces on TEXAS NORTH and SOUTH.

Slide 3



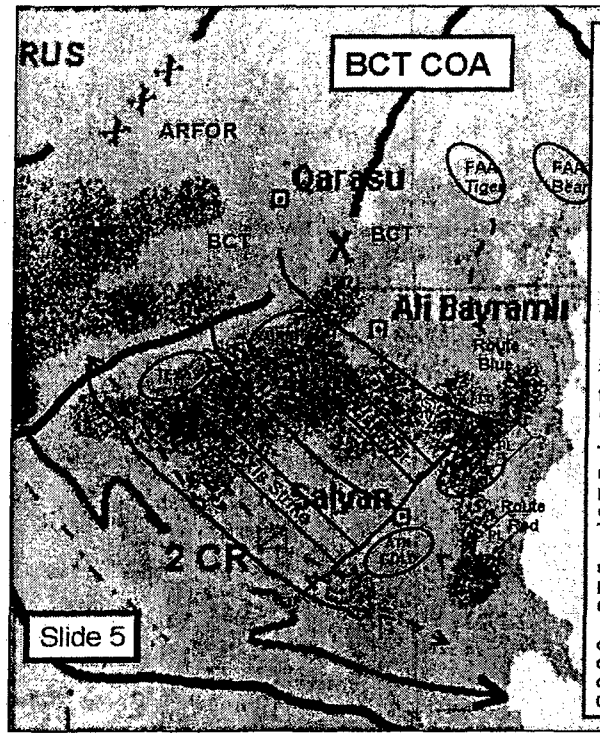
Purpose – To defeat Armenian forces and liberate urban centers in our AO.

Keys Tasks include:

- Using ISR asset to locate threat forces, help determine his intents, and answer CCIR/PIR's.
- Ensuring COP is valid and shared through and across the BCT
- Moving rapidly and striking the threat from unexpected direct to disrupt his C2 and unhinge his defense
- Employing use of long range precision weapon systems to destroy threat platoon or larger sized defensive positions, mobile reserves, C2 and ISR assets

Endstate: Armenian forces in Azerbaijan defeated, urban areas secured,orderly transition to UN peacekeeping forces, and safe re-deploy to homestations.

Slide 4



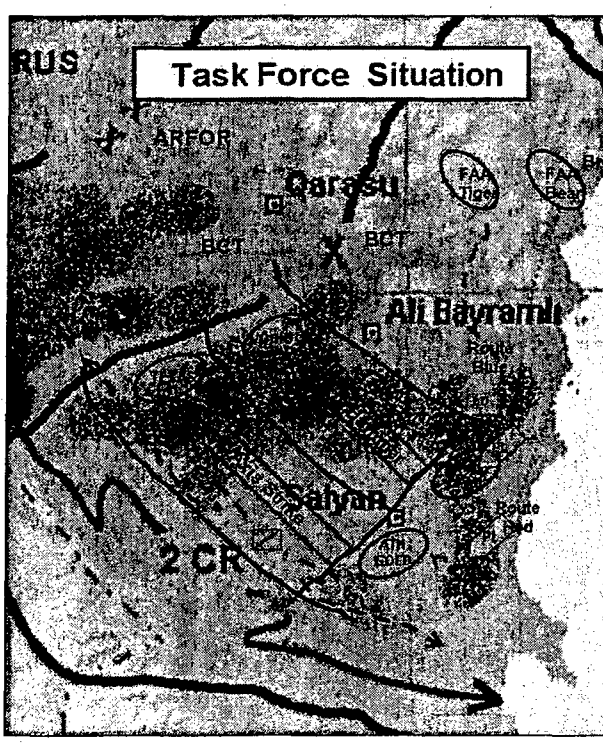
Decisive Operations. On DTG, the BCT moves and O/O, attacks with two Bn TF's abreast to seize OBJ's OHIO and TEXAS; defeating threat forces and seizing control of urban centers. The Bn TF 2-37 Armor in the north attacks to seize OBJ OHIO; defeating threat forces in zone and denying them the ability to interfere with the main effort attack in the south. Bn TF 1-22 IN in the south (MAIN EFFORT) attacks to seize OBJ TEXAS defeating threat forces in zone, and seizing the urban center. The BCT reserve, a tank-heavy team (A/2-37 AR), initially follows the southern Bn TF and focuses on blocking any threat mounted strikes on the BCT's southern flank.

Shaping Operations.
The BCT moves and passes through host nation forces by TF uses Routes Blue and Red and designated passage lanes.

The BRT screens the BCT southern flank, maintaining contact with the 2 ACR, and providing early warning of any threat force capable of striking the BCT's southern flank and TF.

The BCT's third Bn TF (1-46 IN) conducts security operation in the rear area and along the BCT's advance to safeguard the BCT's MSR and CSS activities.

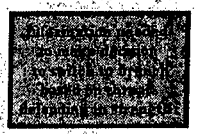
The BCT fires focus initially on counter fire and on threat reconnaissance capabilities. Once TF's cross the LD, fires focus on threat platoon- size or larger targets along AXIS Strike and vicinity OBJ TEXAS.



- *Our TF is currently deployed to Forward Assembly Area Bear in Azerbaijan planning and preparing for movement and operations.*
- *It is now H-24 hours (2300 hrs local) . H-hour is the time the Task Force main body will cross the LD.*
- *TF is composed of two mech and one armor company.*
- *We have a six vehicle Hummer Scout Plt.*
- *We received our digital C2 systems (FBCB2, MCS, ASAS ...) prior to deployment.*
- *During our operation. We will have the BCT's Recon Troop and 2nd Cavalry Regiment on our southern flank and another TF from the BCT on our northern flank.*

Initial CCIR

- Threat platoon or larger-sized forces defending from prepared positions east of PL TED.
- Company or larger sized forces defending in objective areas TEXAS NORTH or SOUTH.
- Failure to see Armenian conventional force withdrawal as BCT/TF advances
- Organized ethnic paramilitary or terrorist forces conducting successful squad or larger sized operations along Axis Strike.



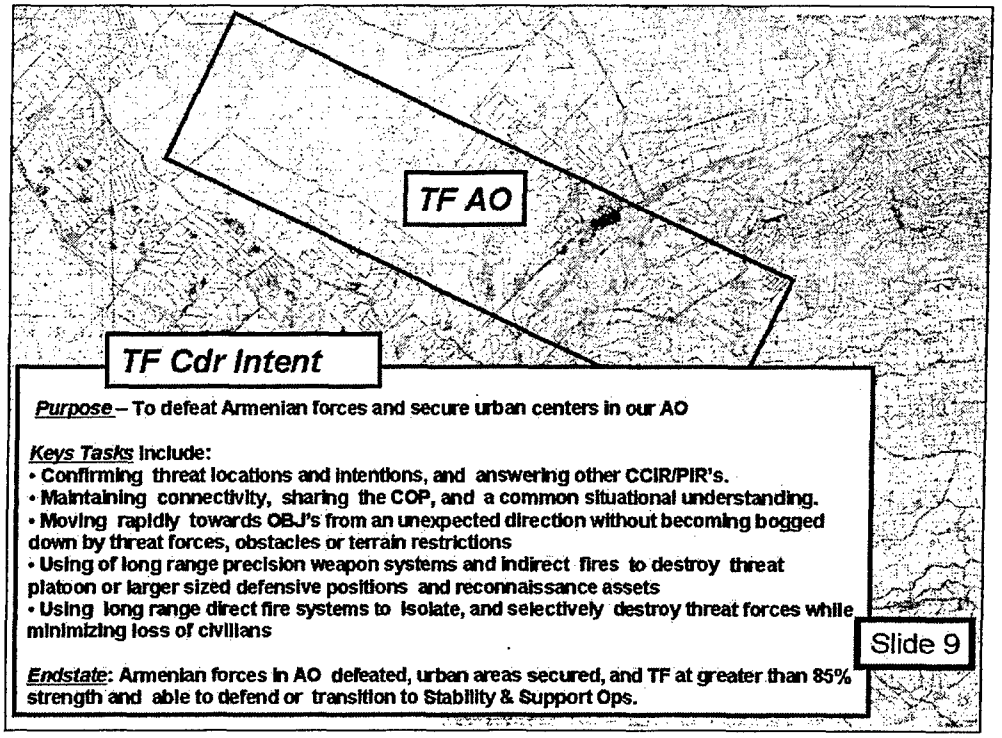
- Iranian forces crossing over border and intervening in favor of Armenian forces.
- 2nd CR is not successful in guarding BCT's southern flank

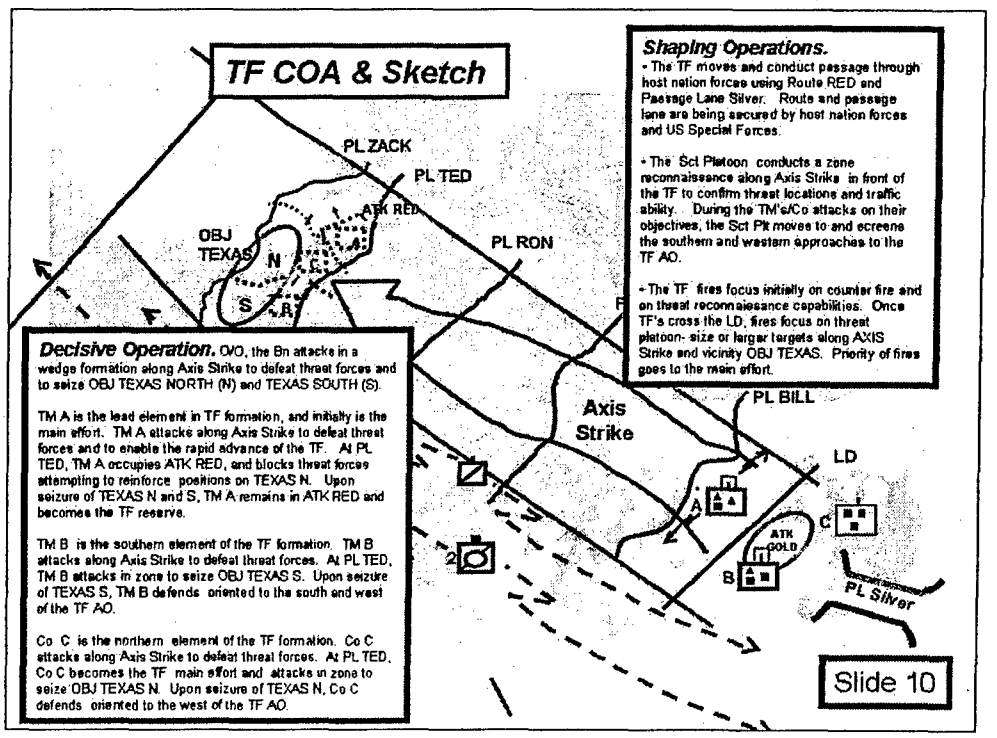
Slide 7

Initial PIR

- What are the locations/activities of any platoon-plus sized units east of PL TED (up to the objective)?
- What units are not withdrawing upon our approach, and seem determined to defend?
- Where is asymmetric resistance, squad or larger, along AXIS STRIKE?
- What is the size and activity of enemy forces on OBJ TEXAS?
- Are there any signs of Iranian activity coming north across the border?

Slide 8


TF AO
TF Cdr Intent
Purpose – To defeat Armenian forces and secure urban centers in our AO
Keys Tasks include:
• Confirming threat locations and intentions, and answering other CCIR/PIR's.
• Maintaining connectivity, sharing the COP, and a common situational understanding.
• Moving rapidly towards OBJ's from an unexpected direction without becoming bogged down by threat forces, obstacles or terrain restrictions
• Using of long range precision weapon systems and indirect fires to destroy threat platoon or larger sized defensive positions and reconnaissance assets
• Using long range direct fire systems to isolate, and selectively destroy threat forces while minimizing loss of civilians
Endstate: Armenian forces in AO defeated, urban areas secured, and TF at greater than 85% strength and able to defend or transition to Stability & Support Ops.
Slide 9


TF COA & Sketch
PL ZACK
PL TED
ATK RED
OBJ TEXAS
N
S
PL RON
Axis Strike
PL BILL
LD
ATK GOLD
A
B
C
PL Silver
Shaping Operations.
• The TF moves and conduct passage through host nation forces using Route RED and Passage Lane Silver. Route and passage lane are being secured by host nation forces and US Special Forces.
• The Sct Platoon conducts a zone reconnaissance along Axis Strike in front of the TF to confirm threat locations and traffic ability. During the TM's/Co attacks on their objectives, the Sct Plt moves to and screens the southern and western approaches to the TF AO.
• The TF fires focus initially on counter fire and on threat reconnaissance capabilities. Once TF's cross the LD, fires focus on threat platoon- size or larger targets along AXIS Strike and vicinity OBJ TEXAS. Priority of fires goes to the main effort.
Decisive Operation. O/O, the Bn attacks in a wedge formation along Axis Strike to defeat threat forces and to seize OBJ TEXAS NORTH (N) and TEXAS SOUTH (S).
TM A is the lead element in TF formation, and initially is the main effort. TM A attacks along Axis Strike to defeat threat forces and to enable the rapid advance of the TF. At PL TED, TM A occupies ATK RED, and blocks threat forces attempting to reinforce positions on TEXAS N. Upon seizure of TEXAS N and S, TM A remains in ATK RED and becomes the TF reserve.
TM B is the southern element of the TF formation. TM B attacks along Axis Strike to defeat threat forces. At PL TED, TM B attacks in zone to seize OBJ TEXAS S. Upon seizure of TEXAS S, TM B defends oriented to the south and west of the TF AO.
Co C is the northern element of the TF formation. Co C attacks along Axis Strike to defeat threat forces. At PL TED, Co C becomes the TF main effort and attacks in zone to seize OBJ TEXAS N. Upon seizure of TEXAS N, Co C defends oriented to the west of the TF AO.
Slide 10

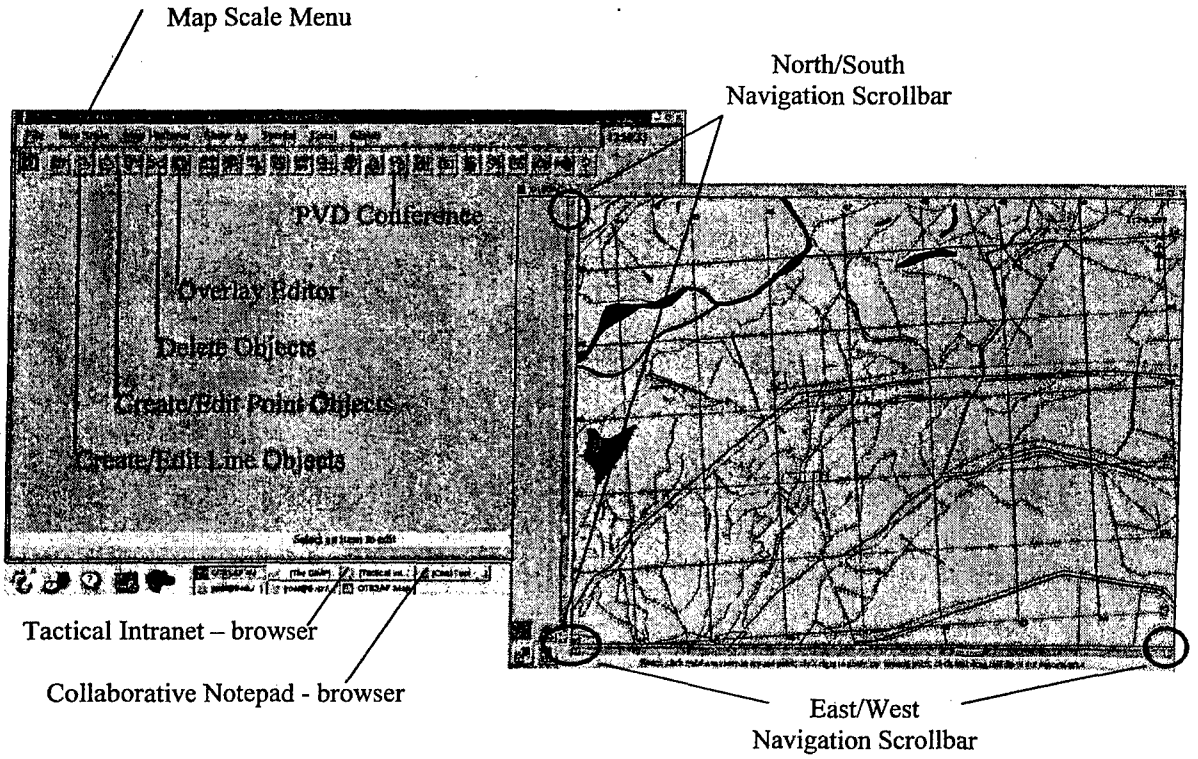
Appendix C

Sample Participant Training/Certification Guide for TF Cdr: Horizontal (Command) Exercise

Exercise/System Elements for Distributed Environment - MODP

1. Voice Communications – Hand-held Radios
2. Tactical Intranet – Web Browser
3. Collaborative Notepad – Web Browser
4. SC4 – Command and Control System

SC4 Dual Screen Application and Exercise Tools



Training/Certification Execution Guide – TF Cdr (Regular 6)

A. Voice Communications – Hand-held Radios

Event	Action	Activity
1. Voice Communications	Perform radio check	• If needed, power on the radio. • Verify or set to channel #1. • Prompt controller for radio check when channel is clear.

B. Tactical Intranet (TI) and Collaborative Notepad – Web Browser

Event	Action	Activity
1. Tactical Intranet and Collaborative Notepad	Login to Tactical Intranet (TI)	• Make (Tactical Intranet) web-browser active. • Click MODP Exercise dropdown and select today's date. • Login by selecting UserID: **TF Cdr** • Type password: **cdr1111** (lower case). • Click Login Button.
	Copy Specified Text	• Click on **General Background Slides** link and wait for slide to load. • Navigate to Slide 7 • Select/highlight phrase next to Purpose starting with "To defeat…" and right-click copy.
	Send Message to group	• Make Collaborative Notepad web-browser active. • Right-click paste "To defeat…" from above into the memo textbox. • Identify sender (**TF Cdr**) with the User dropdown. • Choose message type "Notes" with drop-down. • Click SEND button.
	Minimize Collaborative Notepad	• Minimize (DO NOT CLOSE) Collaborative Notepad window.

C. SC4 – Map Navigation and Overlay Editing

Event	Action	Activity
1. SC4 – Map	Map Scale and Re-center	• Select Map Scale and click 1:500,000. • Re-center map to include objective (OBJ) and 5 company icons (to the east of OBJ). • Select Map Scale and click 1:250,000.

C. SC4 – continued

Event	Action	Activity
2. SC4 – Drawing/Editing Graphics	 Draw/label/edit overlay graphics: Line/Circle	• Click Draw Line Objects button on toolbar. • Draw (by multi-click) a circle in your designated color around the **last unit** (top to bottom). • Type **Reg 6** in the label textbox. • Select Label Location: Center. • Confirm: correct overlay, thickness, color, label, and label position. • If satisfied, click DONE button.
	 Draw/label/edit overlay graphics: Line/Axis	• Click Draw Line Objects button on toolbar. • Draw (by multi-click) an axis of advance in your designated color, from designated unit to OBJ. • Type **AXIS STRIKE** in the label textbox. • Select Label Location: Center. • Confirm: correct overlay, thickness, color, label, and label position. • If satisfied, click DONE button.

2. (cont.) SC4 – Drawing/Editing Graphics	 Draw/label/edit overlay graphics: Point/CP or target reference point (TRP)	• Click Point Objects button on toolbar. • Click Point dropdown to choose type. • Select General for CP **OR** select Target Reference Point for TRP. • Type **Reg 6** in Name textbox. • Click inside OBJ (map) to add the point. • Confirm: correct overlay, point type, name, and color. • If satisfied, click DONE button.
	Save Training Overlay	• Click File Menu. • Select Save Overlay to File--> TRAINING. • Append Filename with your call sign to read: *TRAINING_**Reg6*** • Click *Ok* to save your overlay.

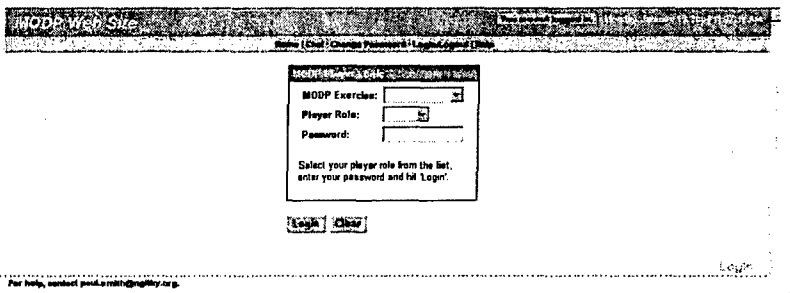
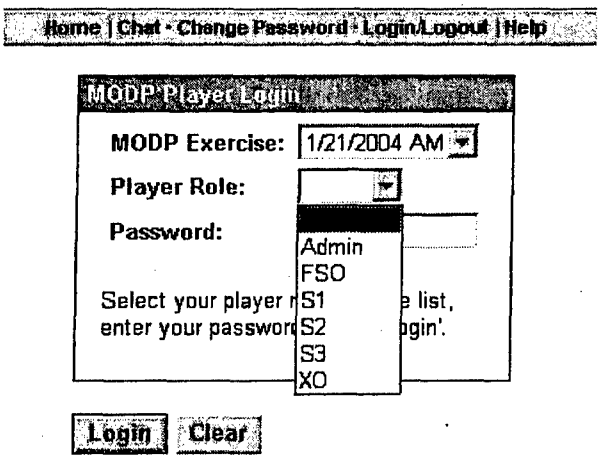
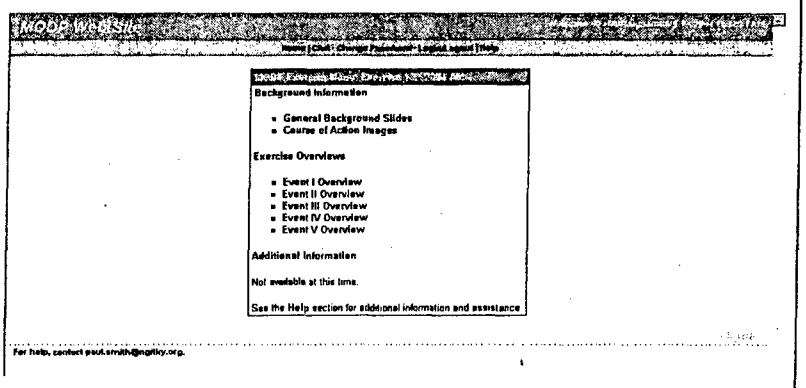
C. SC4 - continued

Event	Action	Activity
3. PVD Conference	Join PVD Conference	• Upon onscreen prompt: Click Yes button to Join plan view display (PVD) Conference. • DO NOT USE APPLICATIONS UNTIL PROMPTED during PVD Conference. • Follow Voice Prompts to participate in PVD Conference. • Once PVD Conference is ended prepare for Task Force Update.

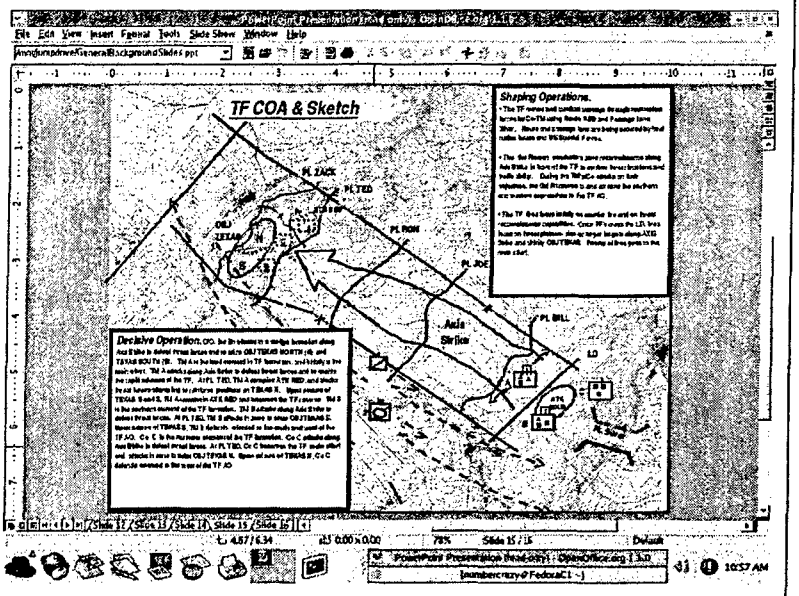
Appendix D

Participant Job Aids:
Horizontal (Staff) and Vertical (Command) Exercises

Tactical Internet – Web Browser Job Aid

1. Web browser active window 	• Login/password • Multiple Links to tactical documents
2. Login to Tactical Intranet 	• Select your role/call sign from user dropdown • Type password: • ***call sign***1111 (i.e., xo1111) • call sign is lower case • Click Login Button
3. Open a document 	• Click on desired link • Slide Presentation Application will open

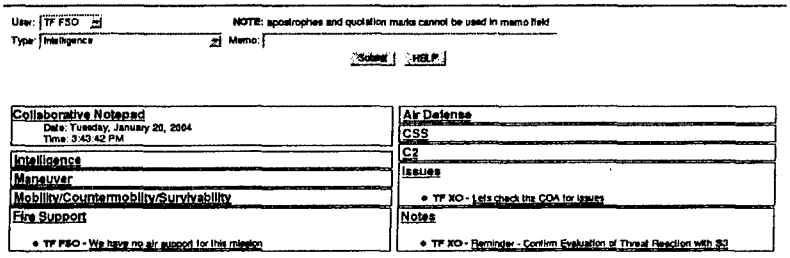
4. Navigate Slides as Needed



- Navigate with Page Up or Page Down keys
- Navigate with Buttons/Tabs at bottom left of the current slide
- When finished either minimize slide window or close file and then minimize slide window
- Will return to browser window (3. Open a document)

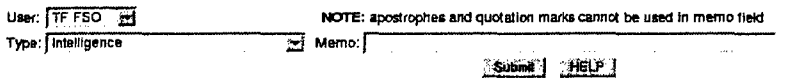
Collaborative Notepad – Web Browser Job Aid

1. Web browser active window



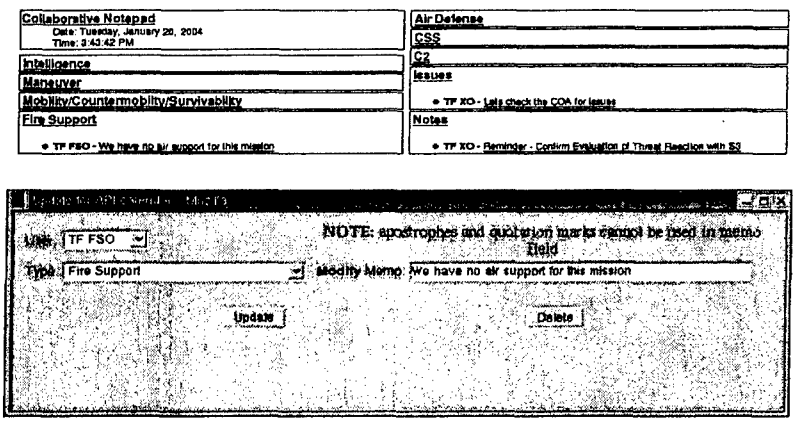
- User (sender) dropdown
- Message type dropdown
- Memo textbox
- Message Areas with message links

2. Send a message



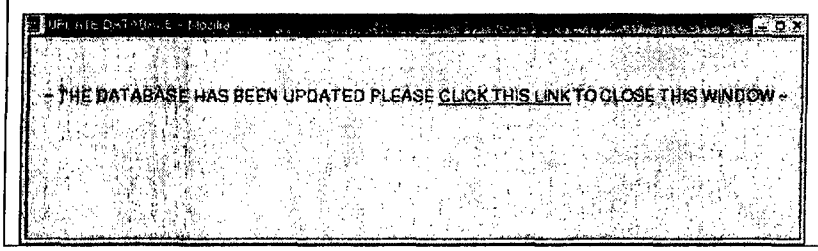
- Select desired message type
- Type memo
- NOTE: Do not use apostrophes (single quote) or quotes in message
- Click Submit

3. Open message for editing



- Click on desired message text link
- New window will open to allow editing
- Edit message as needed
- Click on Update button
- Window will close and a confirmation window will open.

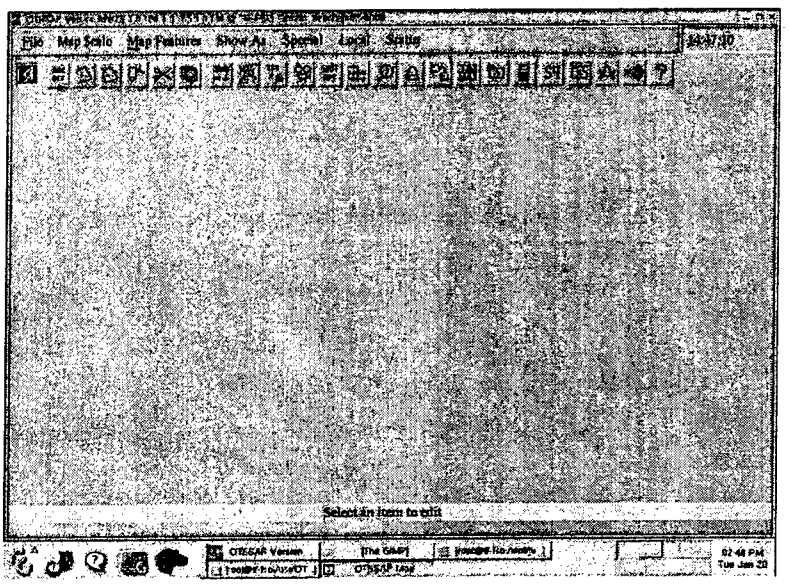
4. Update message confirmation



- Click underlined text link to close window.

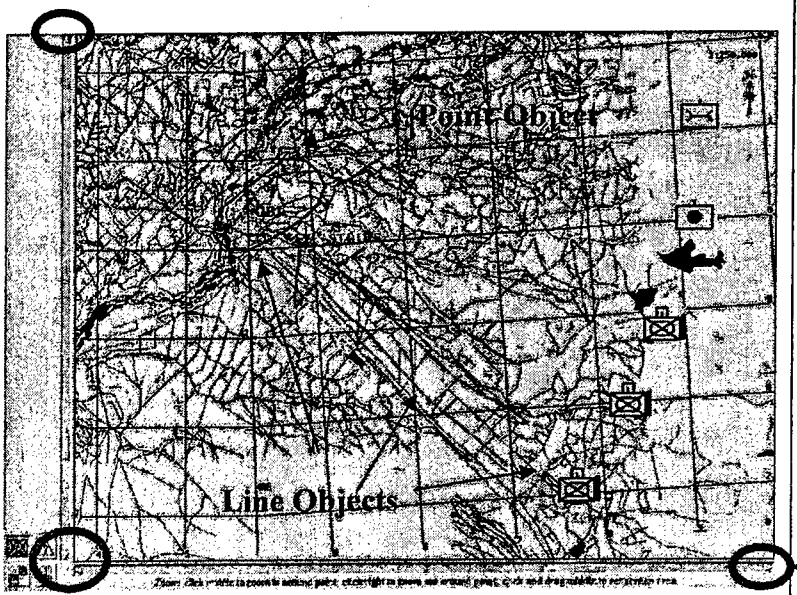
SC4 – C2 System – Dual Screen Job Aid

1. SC4 control interface – Left Screen



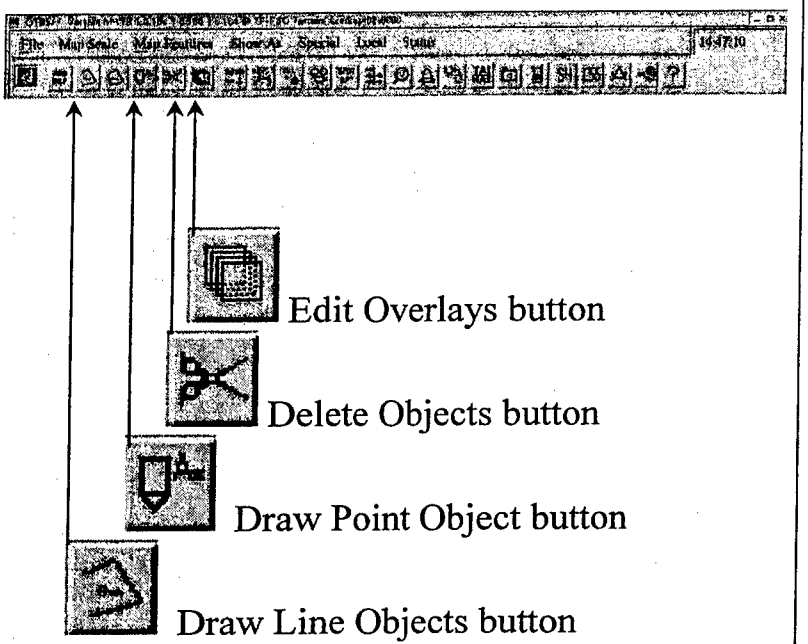
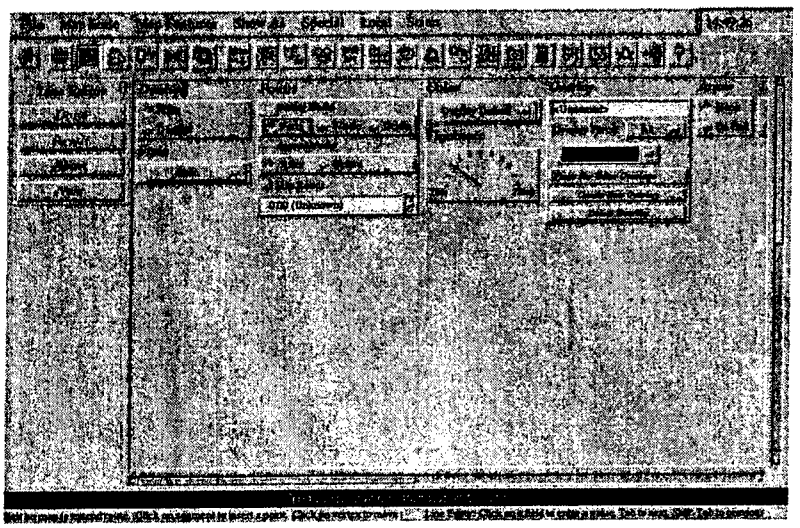
- SC4 – Menus and Toolbar for Application Control.

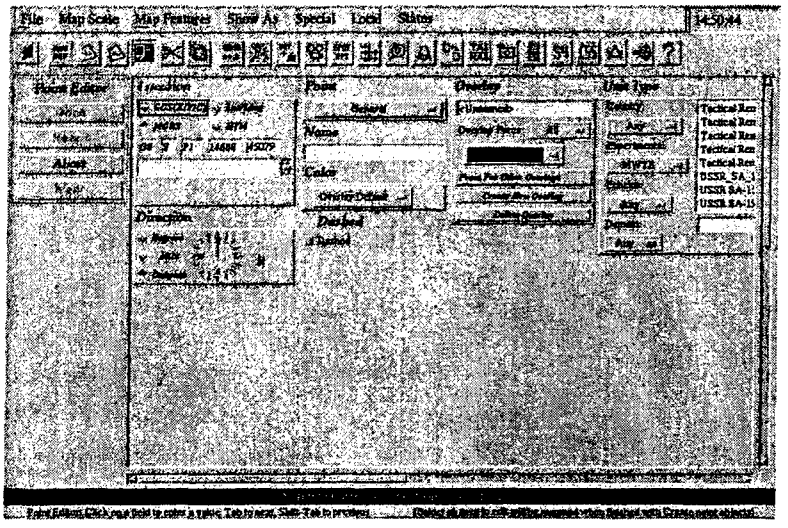
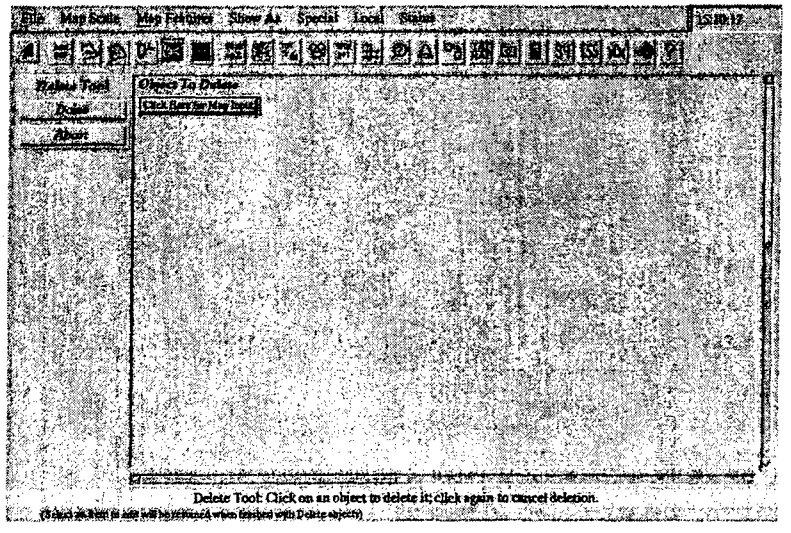
2. SC4 – Map – Right Screen



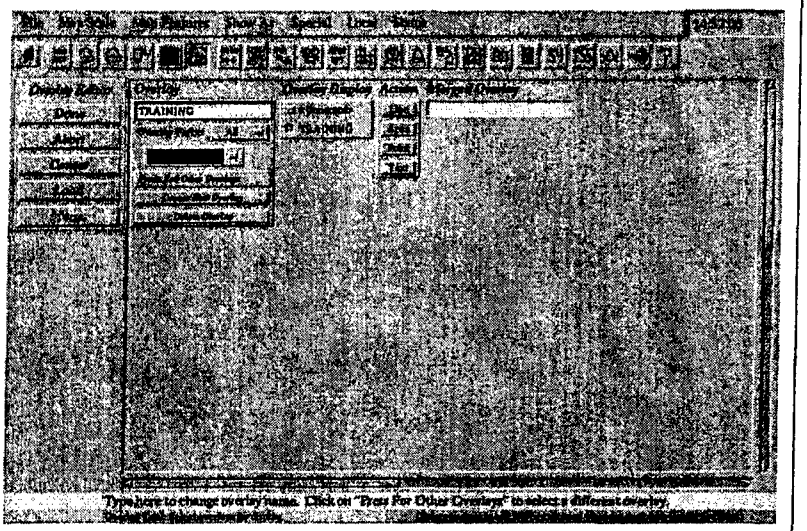
- SC4 – Map display; graphic overlays and unit icons.
- Re-center map by single clicking arrows at ends of vertical (North/South) and horizontal scrollbars (East/West).

East arrow on horizontal scrollbar

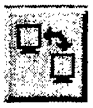
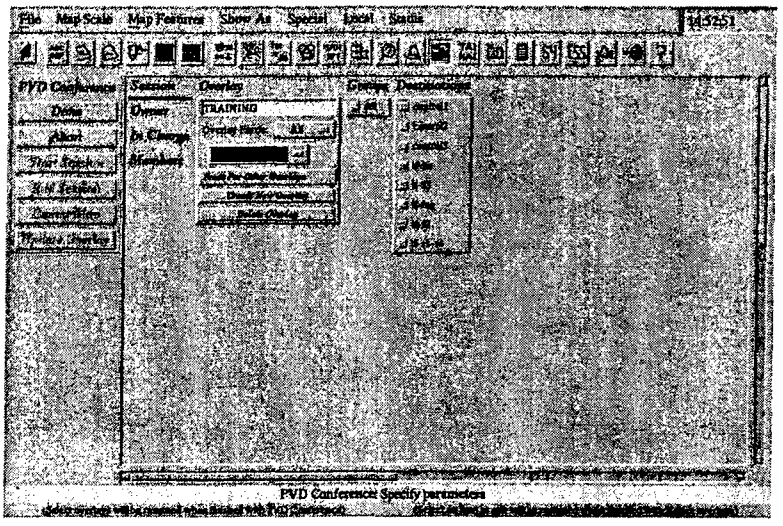
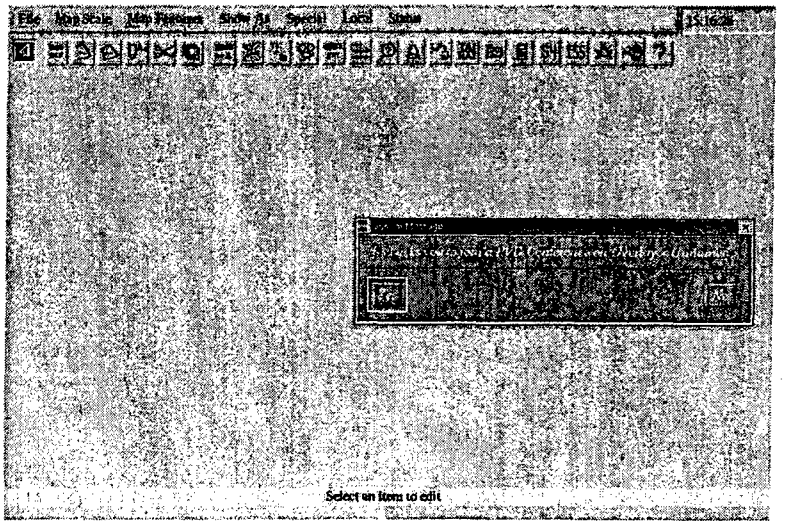
3. SC4 – Menus and Toolbar  	• Use these tools for drawing, labeling, editing and deleting graphic objects.
4. Draw Line Object Tool  	• Click this tool to draw new line objects. • Button click will open the Line Editor interface. • Use the controls to change line object properties. • Draw a new line by multi-click on the SC4-Map display (left screen). • Select existing line object by single click on map line object – opens Line Editor interface. • Confirm: ***Overlay***, ***Thickness***, ***Color***, ***Label***, and ***Label Location***. • Click Done (right screen) to complete changes.

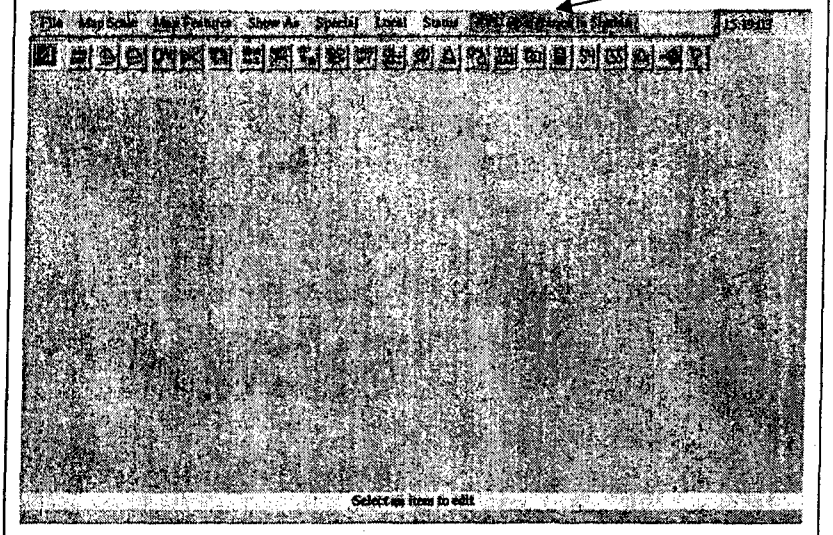
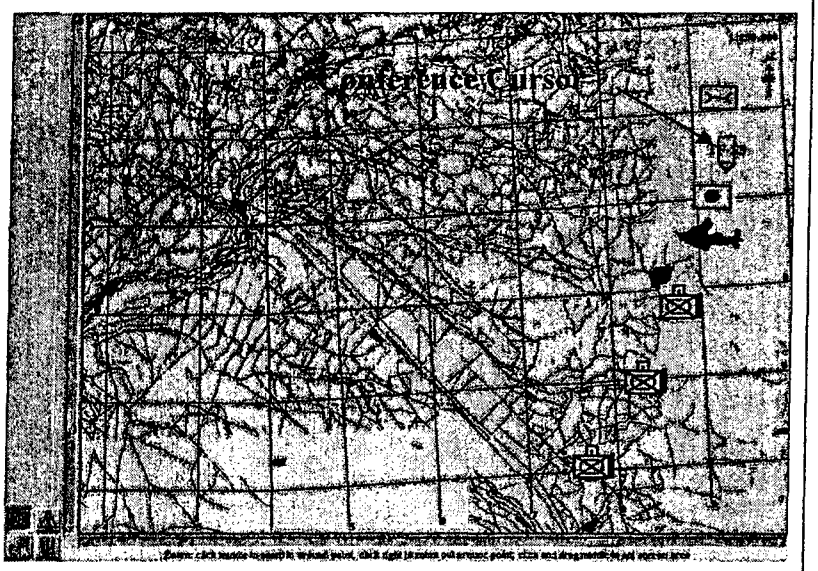
5. Draw Point Object Tool  	• Click this tool to draw new point objects. • Button click will open the Point Editor interface. • Use the controls to change point object properties. • Draw a new point by single click on the SC4-Map display (right screen). • Select existing point object by single click on map point object – opens Point Editor interface • Confirm: ***Overlay***, ***Point*** type, ***Name***, and ***Color***. • Click Done (left screen) to complete changes.
6. Delete Objects Tool  	• Click this tool to delete graphic objects. • Button click will open Delete Objects interface. • Single click object on the SC4-Map display (right screen). • Single-click will add large red X on object. • Click Done (left screen) to complete delete.

7. Overlay Editor Tool



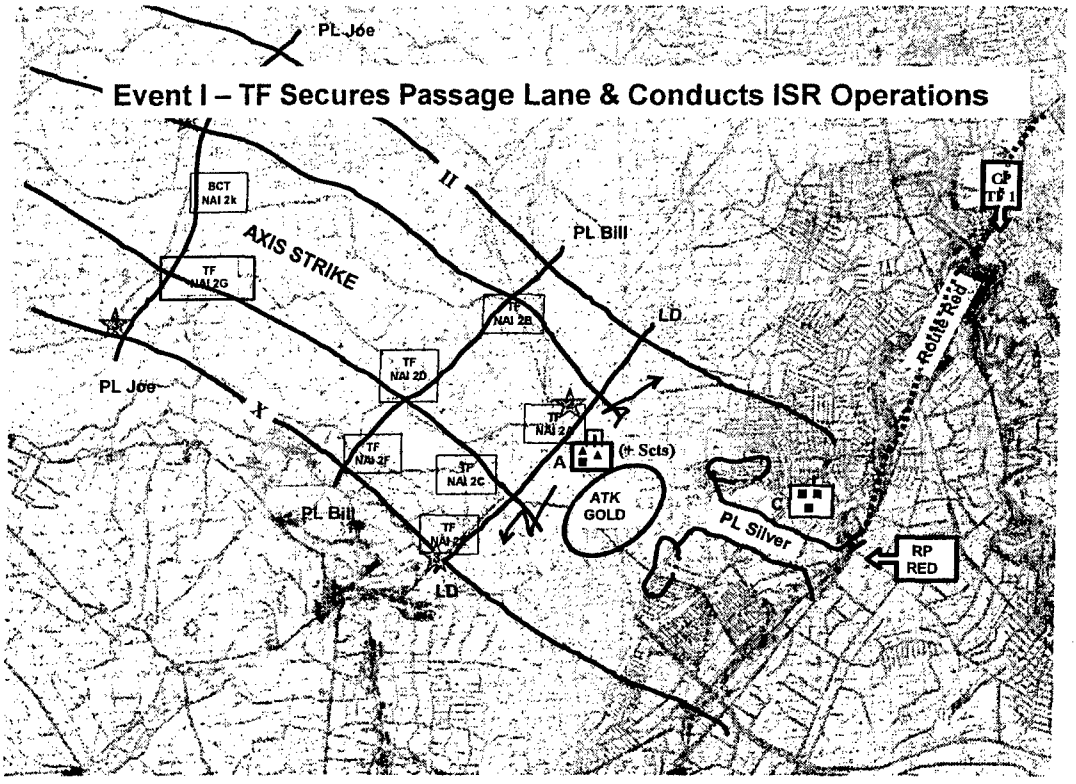
- Click this tool to control display of overlays.
- Button click will open Overlay Editor interface.
- Select overlays by name under ***Overlay Display***.
- Overlays will appear as layers on map (right screen).
- Name of current overlay selection will be in textbox under ***Overlay***.
- Click Done (left screen) to exit interface.

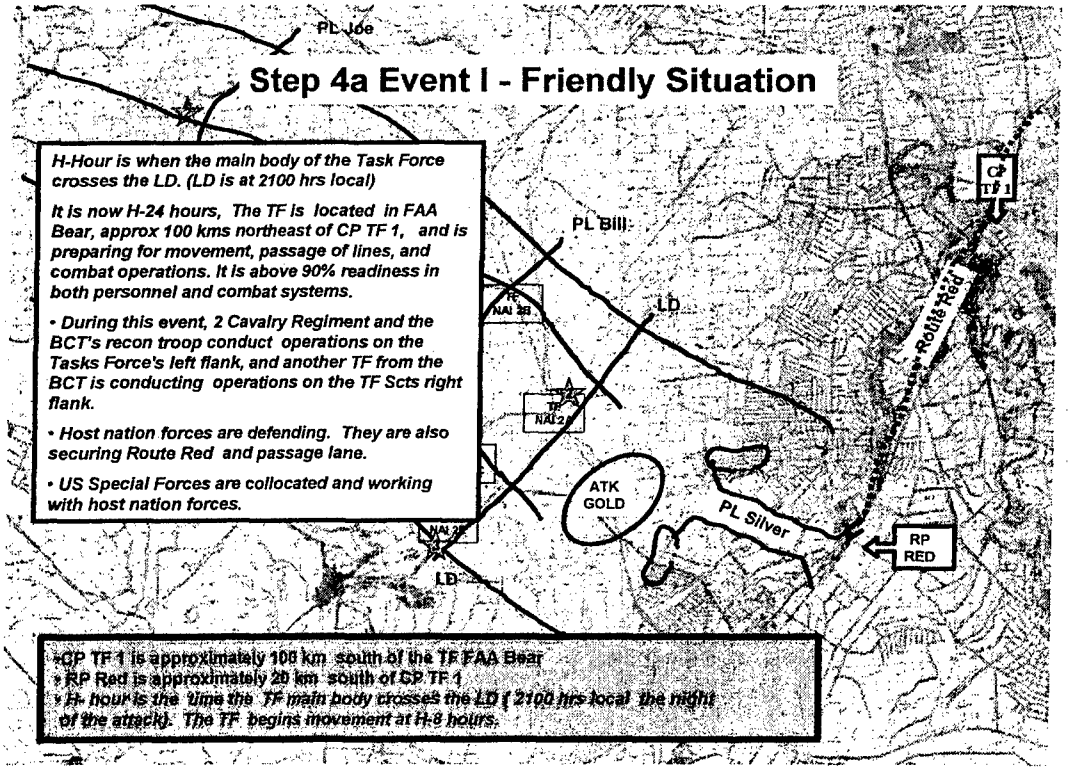
1. PVD Conference Session  	• Click to initiate PVD conference session. • PVD Conference interface will open. • Select All under ***Groups*** to include all participants. • Or select individuals under ***Destinations*** to limit conference participants. • Choose/confirm correct ***Overlay.*** • Click ***Start Session*** button to initiate conference.
2. Conference Prompt 	• Other participants will see prompt to join conference. • Others should select Yes to join PVD conference.

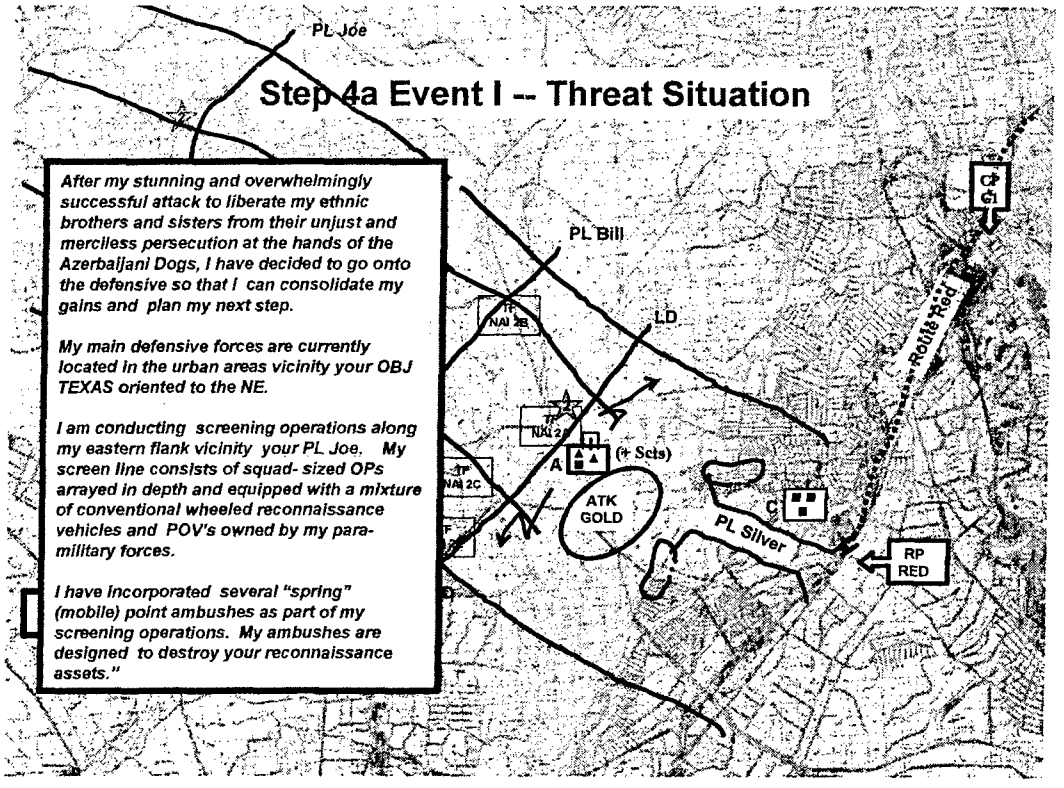
3. Notification of PVD Conference In Session 	• Conference participants will see green Conference In Session notification box.
4. Map display in PVD conference session 	• Conference cursor shows who is "in charge" of current slide. • Participant who is "in charge" can draw/edit graphics on the overlay in conference. • Other participants will see updated overlay as changes are completed. • Click ***Done*** and/or ***Update Overlay*** after drawing to update slide in conference. • Click End Session to end PVD conference.

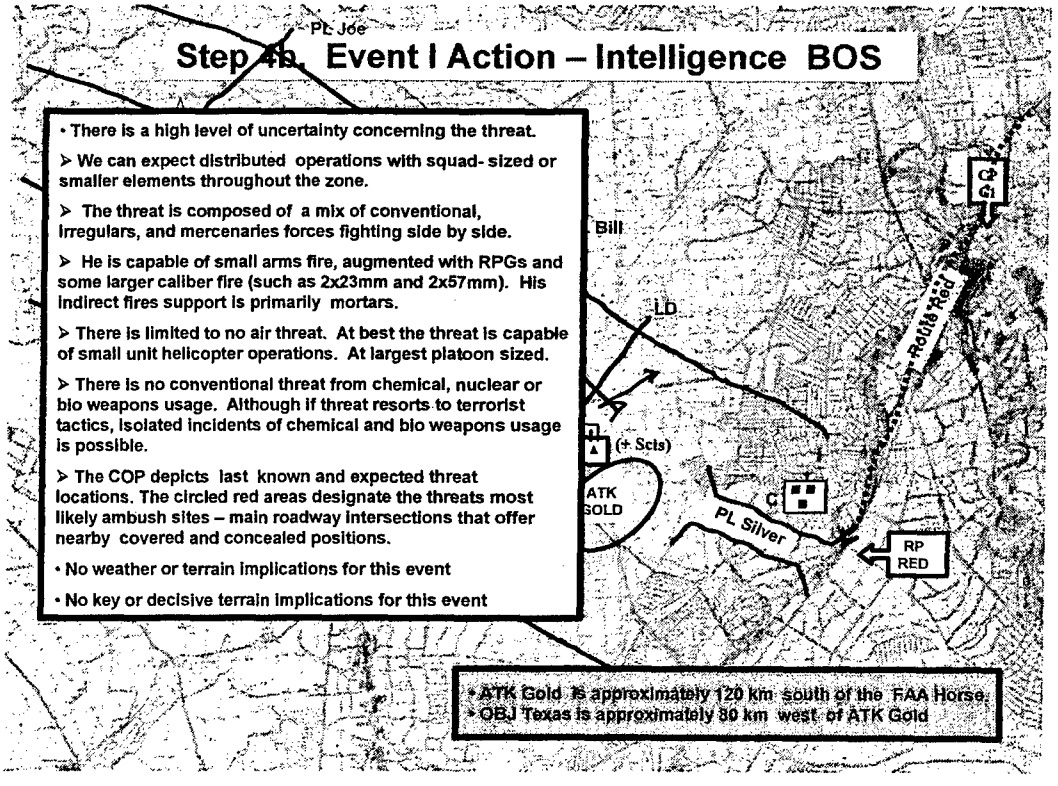
Appendix E

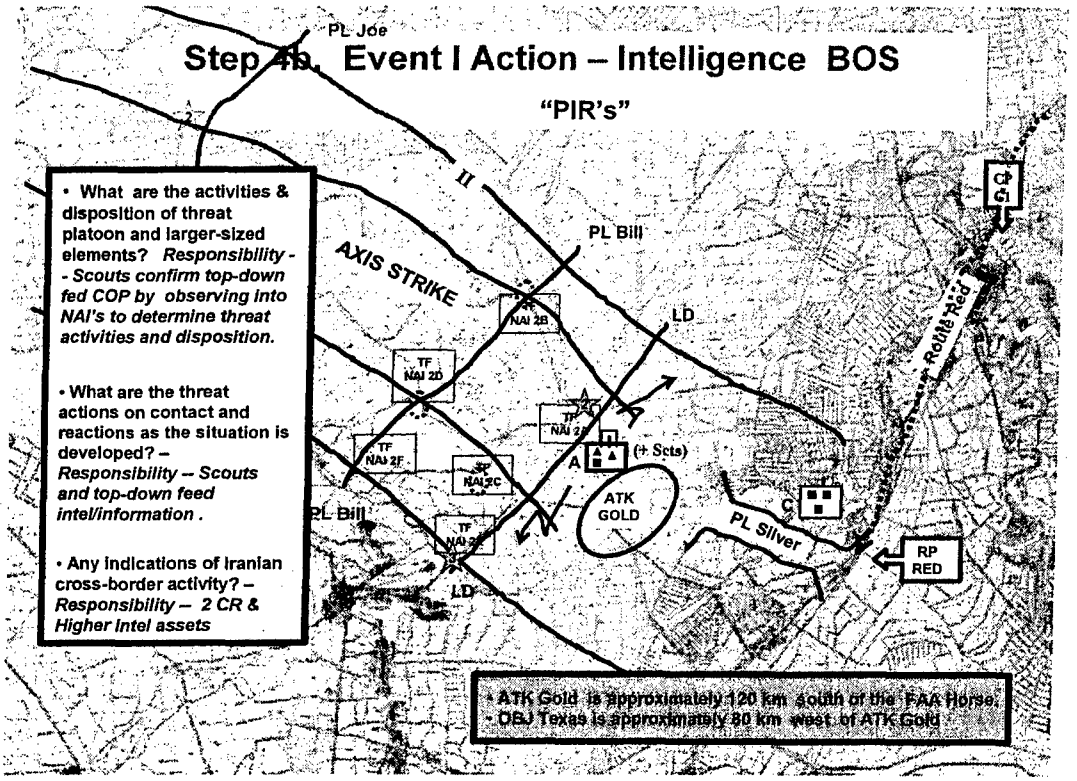
Participant Tactical Materials:
Vertical (Command) Exercise

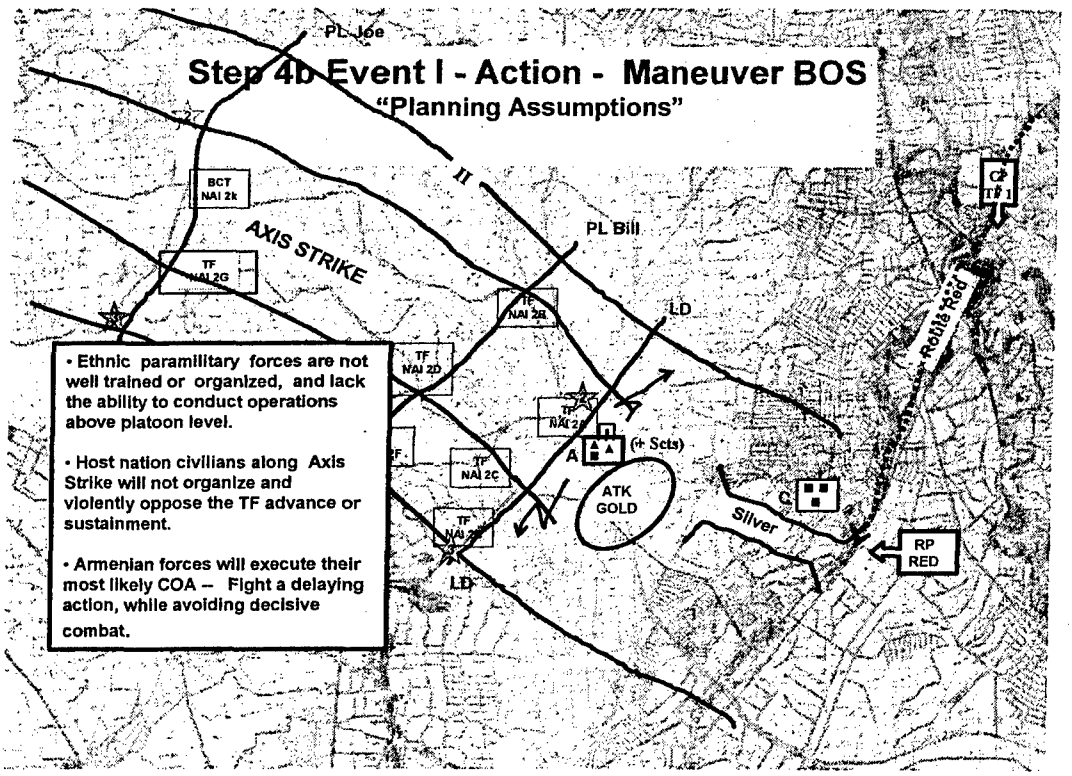

Event I – TF Secures Passage Lane & Conducts ISR Operations
PL Joe
BCT NAI 2k
AXIS STRIKE
TF NAI 2G
PL Bill
LD
TF NAI 2B
TF NAI 2D
TF NAI 2A
TF NAI 2F
TF NAI 2C
(+ Scts)
ATK GOLD
PL Silver
RP RED
CP TF 1
Route Red

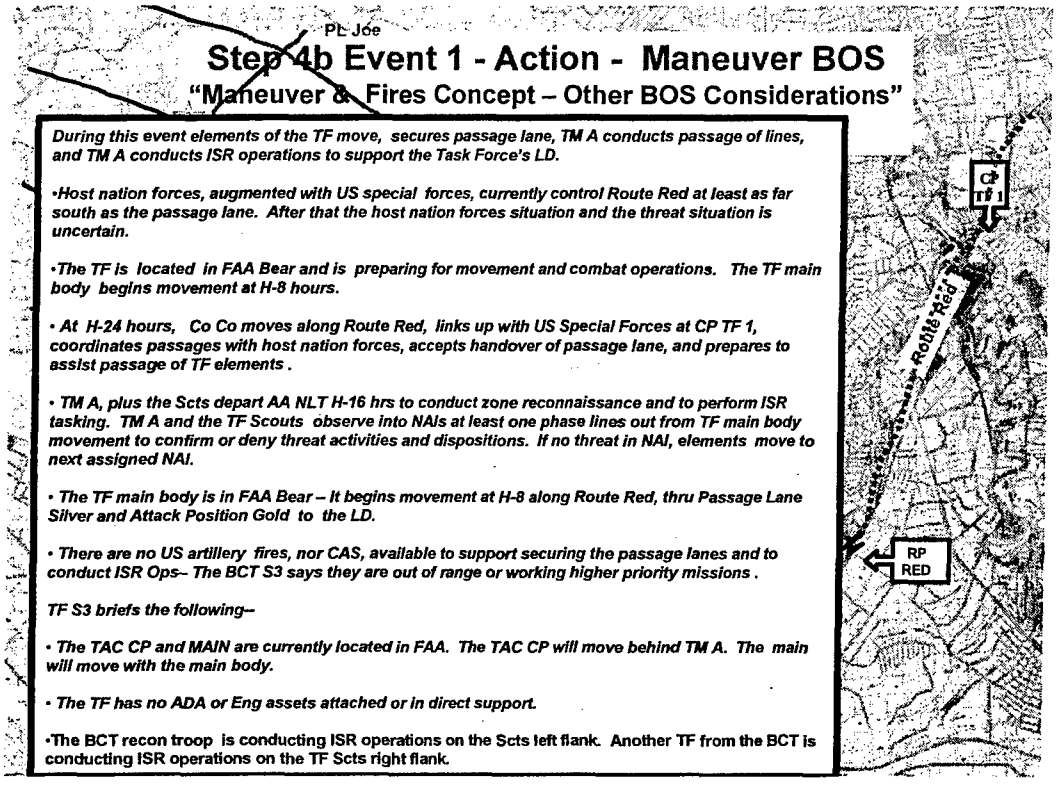

Step 4a Event I - Friendly Situation
PL Joe
H-Hour is when the main body of the Task Force crosses the LD. (LD is at 2100 hrs local)
It is now H-24 hours, The TF is located in FAA Bear, approx 100 kms northeast of CP TF 1, and is preparing for movement, passage of lines, and combat operations. It is above 90% readiness in both personnel and combat systems.
• During this event, 2 Cavalry Regiment and the BCT's recon troop conduct operations on the Tasks Force's left flank, and another TF from the BCT is conducting operations on the TF Scts right flank.
• Host nation forces are defending. They are also securing Route Red and passage lane.
• US Special Forces are collocated and working with host nation forces.
PL Bill
LD
TF NAI 2A
ATK GOLD
PL Silver
RP RED
CP TF 1
Route Red
•CP TF 1 is approximately 100 km south of the TF FAA Bear
• RP Red is approximately 20 km south of CP TF 1
• H- hour is the time the TF main body crosses the LD (2100 hrs local the night of the attack). The TF begins movement at H-8 hours.

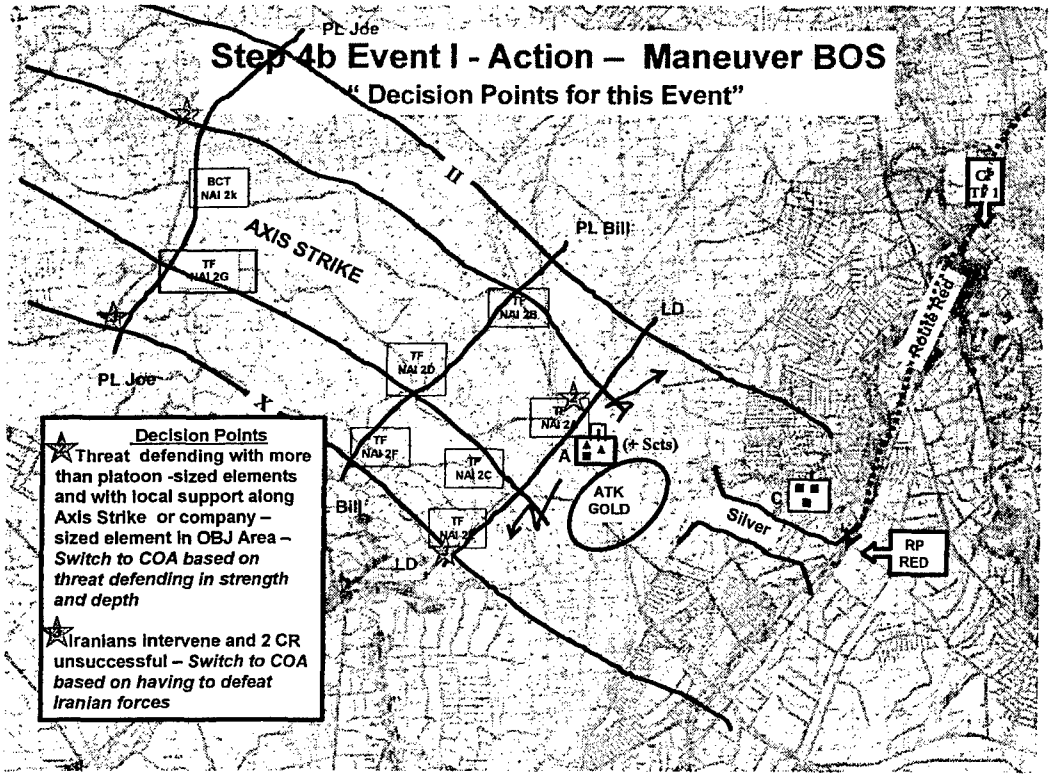

PL Joe
Step 4a Event I -- Threat Situation
After my stunning and overwhelmingly successful attack to liberate my ethnic brothers and sisters from their unjust and merciless persecution at the hands of the Azerbaijani Dogs, I have decided to go onto the defensive so that I can consolidate my gains and plan my next step.
My main defensive forces are currently located in the urban areas vicinity your OBJ TEXAS oriented to the NE.
I am conducting screening operations along my eastern flank vicinity your PL Joe. My screen line consists of squad- sized OPs arrayed in depth and equipped with a mixture of conventional wheeled reconnaissance vehicles and POV's owned by my para-military forces.
I have incorporated several "spring" (mobile) point ambushes as part of my screening operations. My ambushes are designed to destroy your reconnaissance assets."
PL Bill
LD
Route Red
NAI 2B
NAI 2A
NAI 2C
A
(+ Scts)
ATK GOLD
C
PL Silver
RP RED

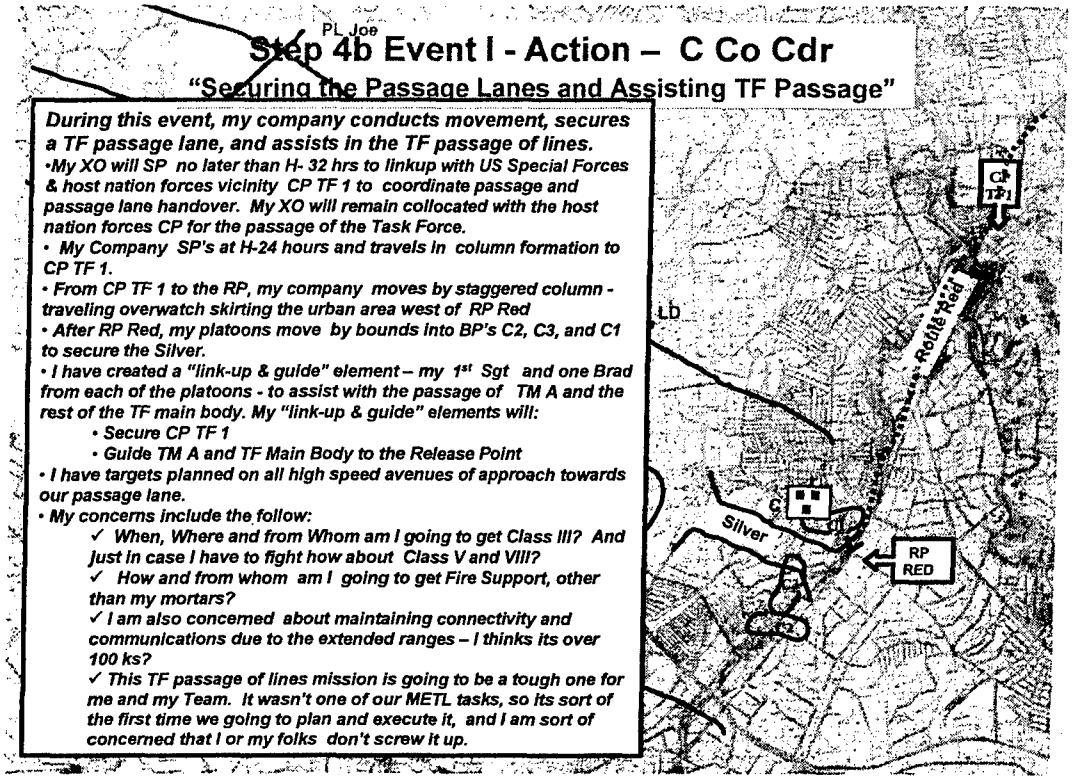

PL Joe
Step 4b Event I Action – Intelligence BOS
• There is a high level of uncertainty concerning the threat.
➢ We can expect distributed operations with squad- sized or smaller elements throughout the zone.
➢ The threat is composed of a mix of conventional, irregulars, and mercenaries forces fighting side by side.
➢ He is capable of small arms fire, augmented with RPGs and some larger caliber fire (such as 2x23mm and 2x57mm). His indirect fires support is primarily mortars.
➢ There is limited to no air threat. At best the threat is capable of small unit helicopter operations. At largest platoon sized.
➢ There is no conventional threat from chemical, nuclear or bio weapons usage. Although if threat resorts to terrorist tactics, isolated incidents of chemical and bio weapons usage is possible.
➢ The COP depicts last known and expected threat locations. The circled red areas designate the threats most likely ambush sites – main roadway intersections that offer nearby covered and concealed positions.
• No weather or terrain implications for this event
• No key or decisive terrain implications for this event
Bill
LD
Route Red
(+ Scts)
ATK GOLD
C
PL Silver
RP RED
• ATK Gold is approximately 120 km south of the FAA Horse.
• OBJ Texas is approximately 80 km west of ATK Gold

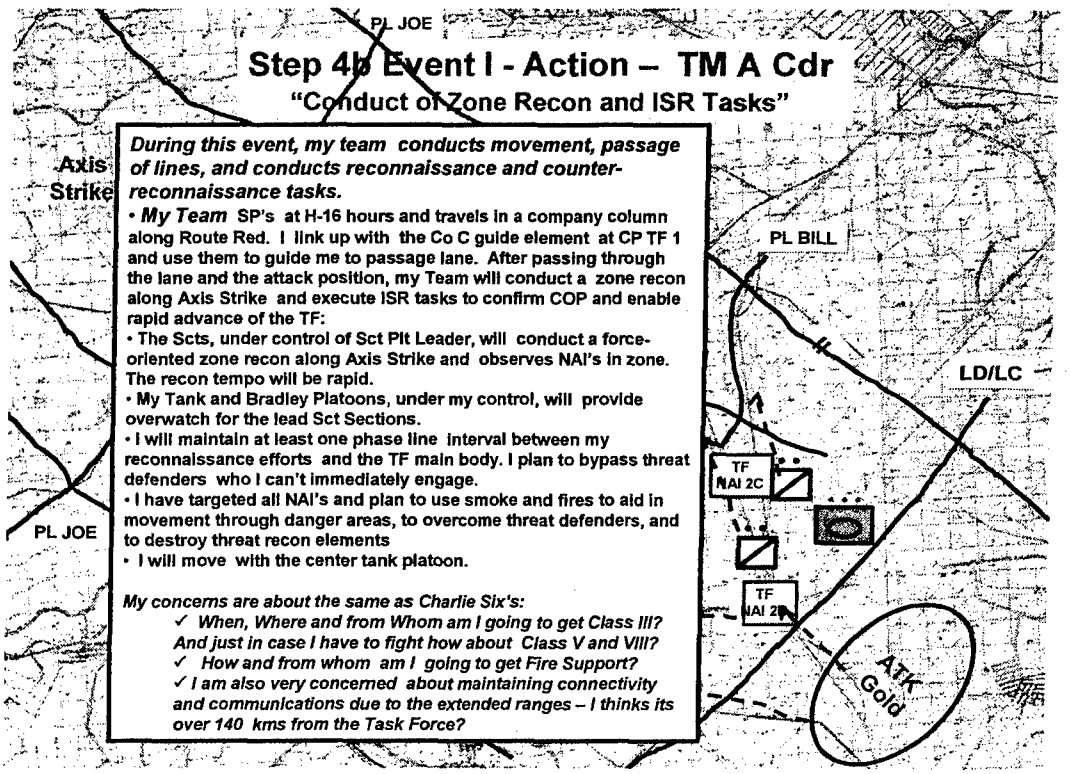

Step 4b. Event I Action – Intelligence BOS
"PIR's"
• What are the activities & disposition of threat platoon and larger-sized elements? Responsibility -- Scouts confirm top-down fed COP by observing into NAI's to determine threat activities and disposition.
• What are the threat actions on contact and reactions as the situation is developed? – Responsibility -- Scouts and top-down feed intel/information .
• Any indications of Iranian cross-border activity? – Responsibility – 2 CR & Higher Intel assets
PL Joe
PL Bill
AXIS STRIKE
LD
ATK GOLD
PL Silver
RP RED
(+ Scts)
• ATK Gold is approximately 120 km south of the FAA Horse.
• OBJ Texas is approximately 80 km west of ATK Gold

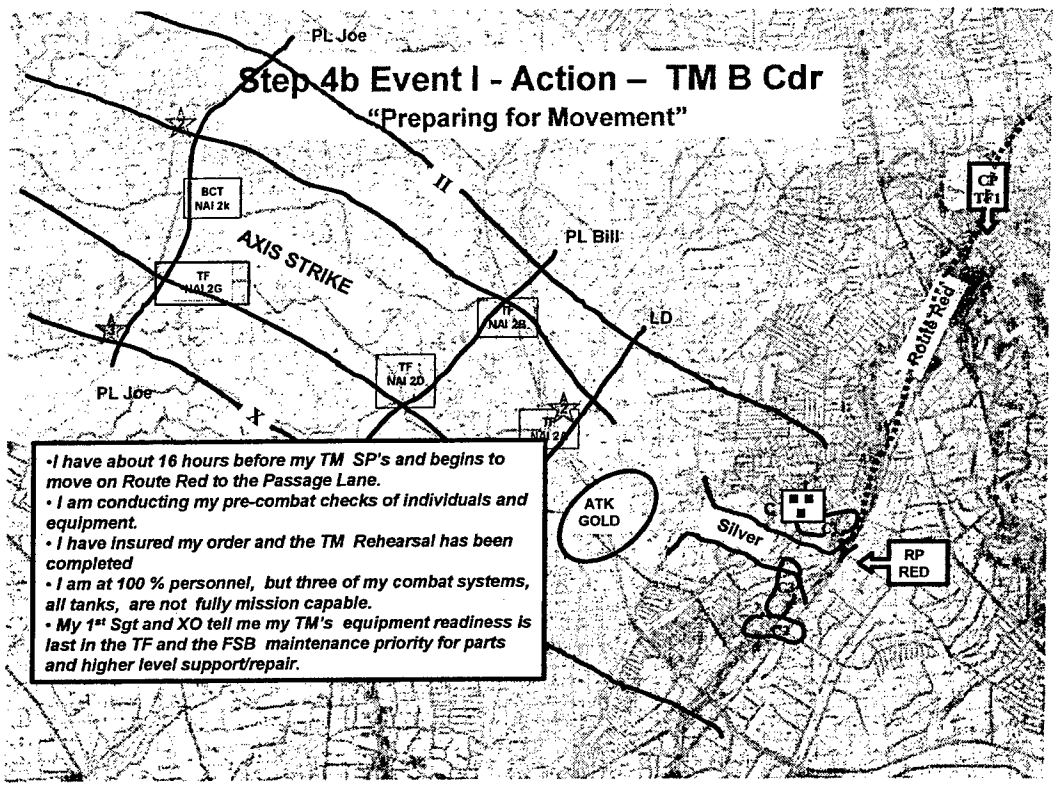

Step 4b Event I - Action - Maneuver BOS
"Planning Assumptions"
• Ethnic paramilitary forces are not well trained or organized, and lack the ability to conduct operations above platoon level.
• Host nation civilians along Axis Strike will not organize and violently oppose the TF advance or sustainment.
• Armenian forces will execute their most likely COA – Fight a delaying action, while avoiding decisive combat.
PL Joe
PL Bill
AXIS STRIKE
LD
ATK GOLD
Silver
RP RED
(+ Scts)

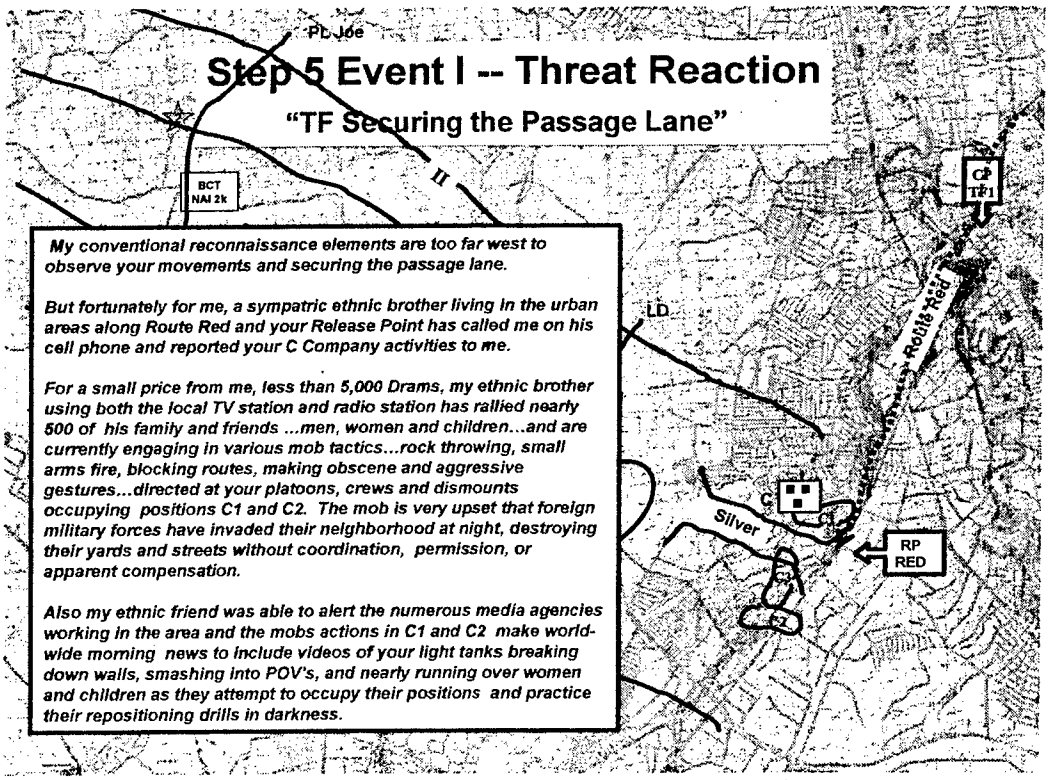

PL Joe
Step 4b Event 1 - Action - Maneuver BOS
"Maneuver & Fires Concept – Other BOS Considerations"
During this event elements of the TF move, secures passage lane, TM A conducts passage of lines, and TM A conducts ISR operations to support the Task Force's LD.
•Host nation forces, augmented with US special forces, currently control Route Red at least as far south as the passage lane. After that the host nation forces situation and the threat situation is uncertain.
•The TF is located in FAA Bear and is preparing for movement and combat operations. The TF main body begins movement at H-8 hours.
• At H-24 hours, Co Co moves along Route Red, links up with US Special Forces at CP TF 1, coordinates passages with host nation forces, accepts handover of passage lane, and prepares to assist passage of TF elements .
• TM A, plus the Scts depart AA NLT H-16 hrs to conduct zone reconnaissance and to perform ISR tasking. TM A and the TF Scouts observe into NAIs at least one phase lines out from TF main body movement to confirm or deny threat activities and dispositions. If no threat in NAI, elements move to next assigned NAI.
• The TF main body is in FAA Bear – It begins movement at H-8 along Route Red, thru Passage Lane Silver and Attack Position Gold to the LD.
• There are no US artillery fires, nor CAS, available to support securing the passage lanes and to conduct ISR Ops– The BCT S3 says they are out of range or working higher priority missions .
TF S3 briefs the following–
• The TAC CP and MAIN are currently located in FAA. The TAC CP will move behind TM A. The main will move with the main body.
• The TF has no ADA or Eng assets attached or in direct support.
•The BCT recon troop is conducting ISR operations on the Scts left flank. Another TF from the BCT is conducting ISR operations on the TF Scts right flank.
CP TF 1
Route Red
RP RED

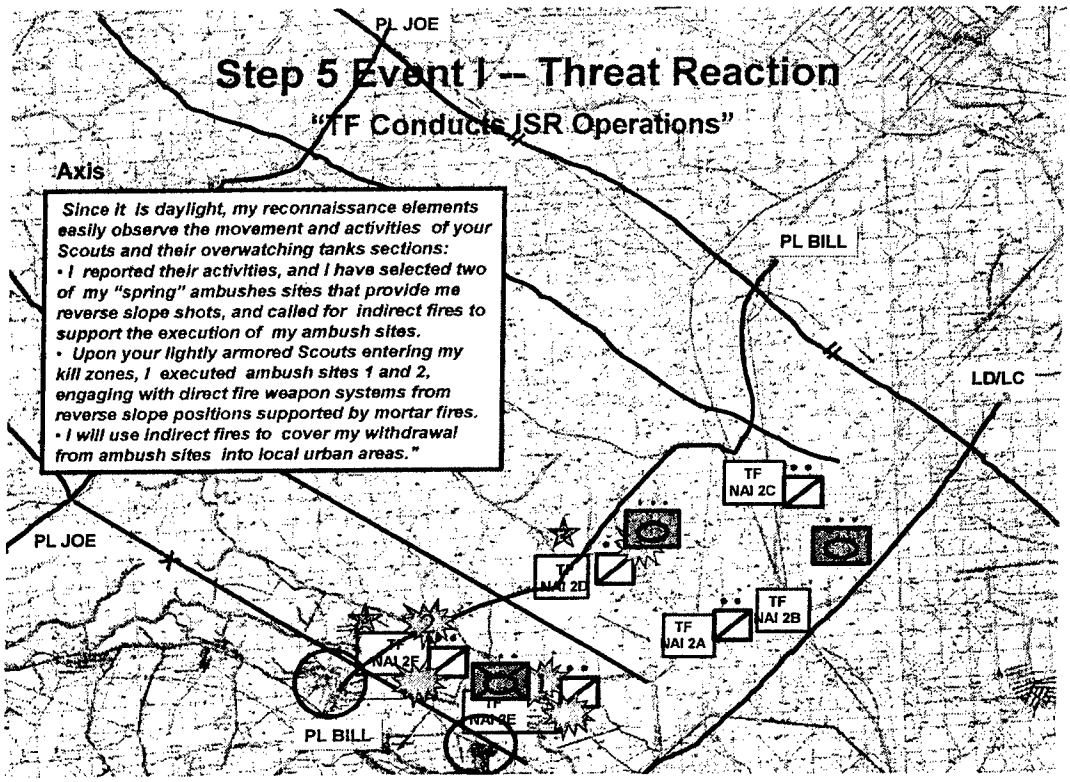

PL Joe
Step 4b Event I - Action – Maneuver BOS
" Decision Points for this Event"
BCT NAI 2k
AXIS STRIKE
TF NAI 2G
PL Joe
PL Bill
TF NAI 2B
TF NAI 2D
TF NAI 2A
TF NAI 2F
TF NAI 2C
TF NAI 2E
LD
A
(+ Scts)
ATK GOLD
C
Silver
Bill
LD
Decision Points
Threat defending with more than platoon -sized elements and with local support along Axis Strike or company – sized element in OBJ Area – Switch to COA based on threat defending in strength and depth
Iranians intervene and 2 CR unsuccessful – Switch to COA based on having to defeat Iranian forces
CP TF 1
Route Red
RP RED

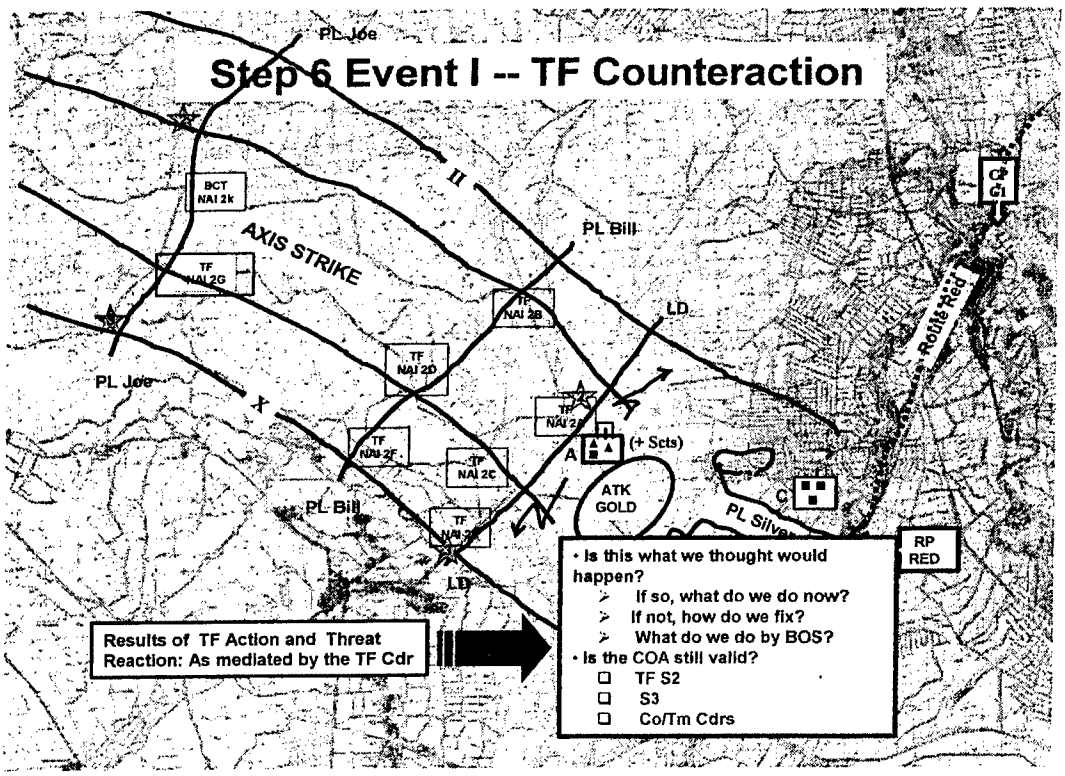

PL Joe
Step 4b Event I - Action – C Co Cdr
"Securing the Passage Lanes and Assisting TF Passage"
During this event, my company conducts movement, secures a TF passage lane, and assists in the TF passage of lines.
•My XO will SP no later than H- 32 hrs to linkup with US Special Forces & host nation forces vicinity CP TF 1 to coordinate passage and passage lane handover. My XO will remain collocated with the host nation forces CP for the passage of the Task Force.
• My Company SP's at H-24 hours and travels in column formation to CP TF 1.
• From CP TF 1 to the RP, my company moves by staggered column - traveling overwatch skirting the urban area west of RP Red
• After RP Red, my platoons move by bounds into BP's C2, C3, and C1 to secure the Silver.
• I have created a "link-up & guide" element – my 1st Sgt and one Brad from each of the platoons - to assist with the passage of TM A and the rest of the TF main body. My "link-up & guide" elements will:
• Secure CP TF 1
• Guide TM A and TF Main Body to the Release Point
• I have targets planned on all high speed avenues of approach towards our passage lane.
• My concerns include the follow:
✓ When, Where and from Whom am I going to get Class III? And just in case I have to fight how about Class V and VIII?
✓ How and from whom am I going to get Fire Support, other than my mortars?
✓ I am also concerned about maintaining connectivity and communications due to the extended ranges – I thinks its over 100 ks?
✓ This TF passage of lines mission is going to be a tough one for me and my Team. It wasn't one of our METL tasks, so its sort of the first time we going to plan and execute it, and I am sort of concerned that I or my folks don't screw it up.
LD
Red
Silver
RP RED

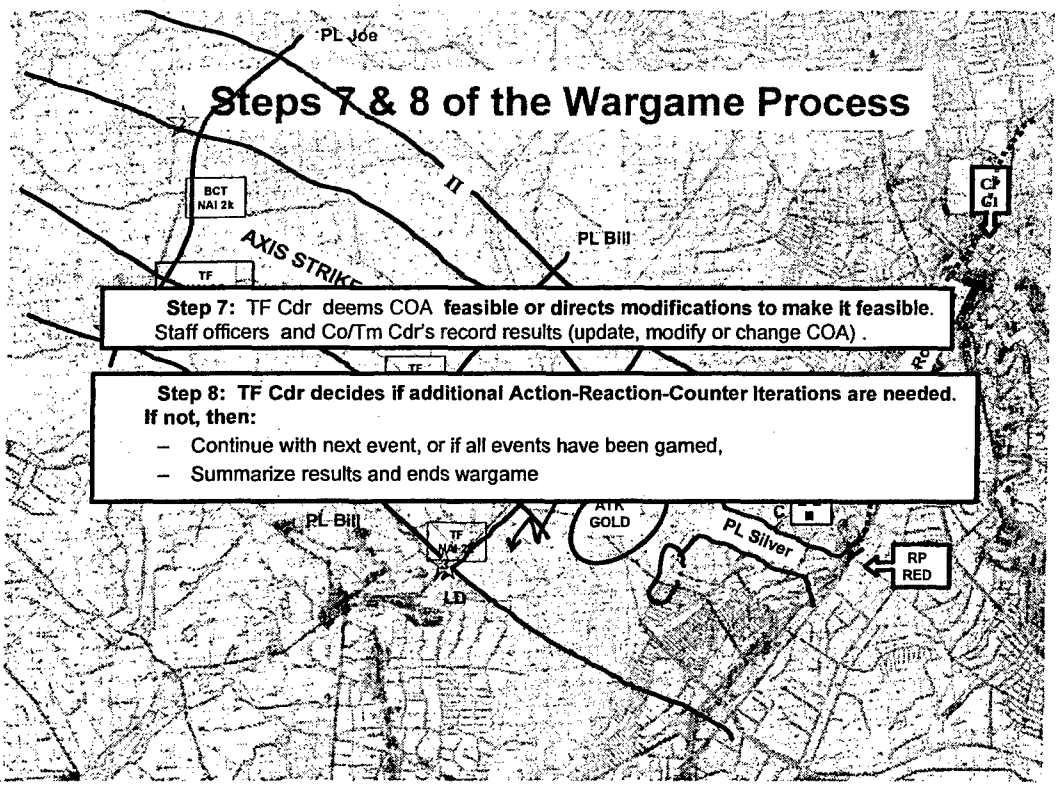

PL JOE
Step 4b Event I - Action – TM A Cdr
"Conduct of Zone Recon and ISR Tasks"
Axis Strike
During this event, my team conducts movement, passage of lines, and conducts reconnaissance and counter-reconnaissance tasks.
• My Team SP's at H-16 hours and travels in a company column along Route Red. I link up with the Co C guide element at CP TF 1 and use them to guide me to passage lane. After passing through the lane and the attack position, my Team will conduct a zone recon along Axis Strike and execute ISR tasks to confirm COP and enable rapid advance of the TF:
• The Scts, under control of Sct Plt Leader, will conduct a force-oriented zone recon along Axis Strike and observes NAI's in zone. The recon tempo will be rapid.
• My Tank and Bradley Platoons, under my control, will provide overwatch for the lead Sct Sections.
• I will maintain at least one phase line interval between my reconnaissance efforts and the TF main body. I plan to bypass threat defenders who I can't immediately engage.
• I have targeted all NAI's and plan to use smoke and fires to aid in movement through danger areas, to overcome threat defenders, and to destroy threat recon elements
• I will move with the center tank platoon.
My concerns are about the same as Charlie Six's:
✓ When, Where and from Whom am I going to get Class III? And just in case I have to fight how about Class V and VIII?
✓ How and from whom am I going to get Fire Support?
✓ I am also very concerned about maintaining connectivity and communications due to the extended ranges – I thinks its over 140 kms from the Task Force?
PL JOE
PL BILL
LD/LC
TF NAI 2C
TF NAI 2B
ATK Gold


PL Joe
Step 4b Event I - Action – TM B Cdr
"Preparing for Movement"
BCT NAI 2k
AXIS STRIKE
TF NAI 2G
TF NAI 2B
TF NAI 2A
PL Bill
LD
Route Red
CP TF1
PL Joe
•I have about 16 hours before my TM SP's and begins to move on Route Red to the Passage Lane.
• I am conducting my pre-combat checks of individuals and equipment.
• I have insured my order and the TM Rehearsal has been completed
• I am at 100 % personnel, but three of my combat systems, all tanks, are not fully mission capable.
• My 1st Sgt and XO tell me my TM's equipment readiness is last in the TF and the FSB maintenance priority for parts and higher level support/repair.
ATK GOLD
Silver
C1
C2
RP RED


PL Joe
Step 5 Event I -- Threat Reaction
"TF Securing the Passage Lane"
BCT NAI 2k
My conventional reconnaissance elements are too far west to observe your movements and securing the passage lane.
But fortunately for me, a sympatric ethnic brother living in the urban areas along Route Red and your Release Point has called me on his cell phone and reported your C Company activities to me.
For a small price from me, less than 5,000 Drams, my ethnic brother using both the local TV station and radio station has rallied nearly 500 of his family and friends ...men, women and children...and are currently engaging in various mob tactics...rock throwing, small arms fire, blocking routes, making obscene and aggressive gestures...directed at your platoons, crews and dismounts occupying positions C1 and C2. The mob is very upset that foreign military forces have invaded their neighborhood at night, destroying their yards and streets without coordination, permission, or apparent compensation.
Also my ethnic friend was able to alert the numerous media agencies working in the area and the mobs actions in C1 and C2 make world-wide morning news to include videos of your light tanks breaking down walls, smashing into POV's, and nearly running over women and children as they attempt to occupy their positions and practice their repositioning drills in darkness.
LD
Route Red
CP TF1
Silver
C1
C2
RP RED


PL JOE
Step 5 Event I -- Threat Reaction
"TF Conducts ISR Operations"
Axis
Since it is daylight, my reconnaissance elements easily observe the movement and activities of your Scouts and their overwatching tanks sections:
• I reported their activities, and I have selected two of my "spring" ambushes sites that provide me reverse slope shots, and called for indirect fires to support the execution of my ambush sites.
• Upon your lightly armored Scouts entering my kill zones, I executed ambush sites 1 and 2, engaging with direct fire weapon systems from reverse slope positions supported by mortar fires.
• I will use indirect fires to cover my withdrawal from ambush sites into local urban areas."
PL BILL
LD/LC
TF NAI 2C
PL JOE
TF NAI 2D
TF NAI 2B
TF NAI 2A
TF NAI 2F
TF NAI 2E
PL BILL


PL Joe
Step 6 Event I -- TF Counteraction
BCT NAI 2k
AXIS STRIKE
PL Bill
TF NAI 2G
TF NAI 2B
LD
Route Red
TF NAI 2D
PL Joe
TF NAI 2A
(+ Scts)
A
TF NAI 2F
TF NAI 2C
ATK GOLD
C
PL Bill
PL Silver
RP RED
LD
Results of TF Action and Threat Reaction: As mediated by the TF Cdr
• Is this what we thought would happen?
➢ If so, what do we do now?
➢ If not, how do we fix?
➢ What do we do by BOS?
• Is the COA still valid?
☐ TF S2
☐ S3
☐ Co/Tm Cdrs


PL Joe
Steps 7 & 8 of the Wargame Process
BCT
NAI 2k
AXIS STRIKE
TF
PL Bill
Step 7: TF Cdr deems COA feasible or directs modifications to make it feasible.
Staff officers and Co/Tm Cdr's record results (update, modify or change COA) .
Step 8: TF Cdr decides if additional Action-Reaction-Counter Iterations are needed.
If not, then:
– Continue with next event, or if all events have been gamed,
– Summarize results and ends wargame
PL Bill
TF
ATK
GOLD
PL Silver
RP
RED
LD

Appendix F

Sample Participant Wargame Execution Guide: Horizontal (Staff) Exercise, Event 1

War Game Exercise General Guidance

Event I Wargame Execution Guide – TF S2

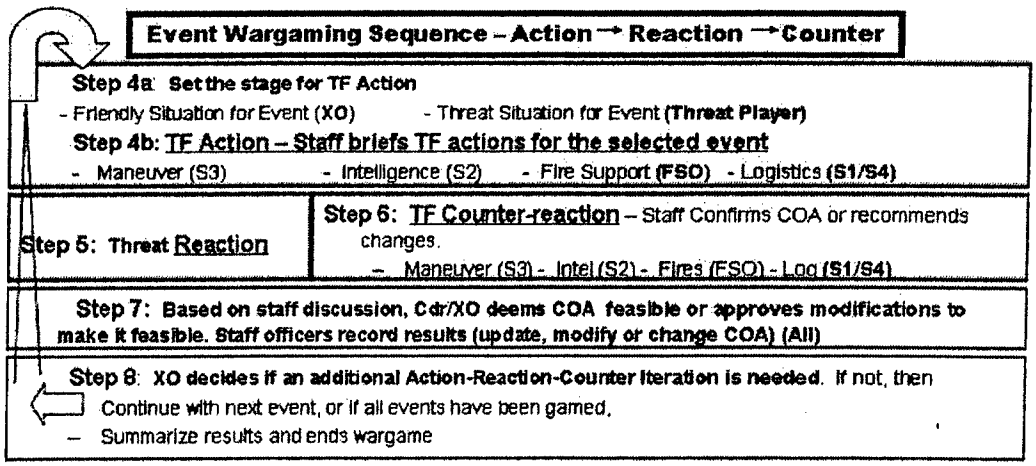
The wargame execution guide provides detailed sequencing, procedures, and control guidance for wargaming a critical event. It also includes staff briefing materials, discussion cues, and a player script used to quickly establish a shared common vision as each event is war gamed. Each player is provided a guide designed specifically for his position in the wargame and for the specific event being war gamed.

The diagram below depicts Steps 4-8 of a modified wargaming process built upon the wargame process found in FM 5.0. In the execution guides, Step 4. *Situation Updates and TF Actions* and Step 5. *Red Reaction* are scripted out for each battle staff member so that a shared common vision of the operation can quickly be achieved without undue burden on the wargame participants. All scripts and support overlays/briefing slides needed for Steps 4 and 5 can be found in the Wargame Directory. ***Step 6, TF Counteraction is not scripted. The TF Counteraction Step is a freeplay TF XO-controlled discussion between of the TF staff members to see how feasible and flexible the COA is, to identify any gaps or weaknesses in the COA, and to make recommendation on how to remedy gaps and weaknesses***. A key concern is to ensure the battlefield operating systems (BOSs) are synchronized throughout the event. Another key concern is the confirmation or identification of any decision that the TF Cdr has to make. All modifications to the COA, required follow-on actions, and decisions must be recorded and shared with the appropriate parties.

Horizontal Exercise Execution

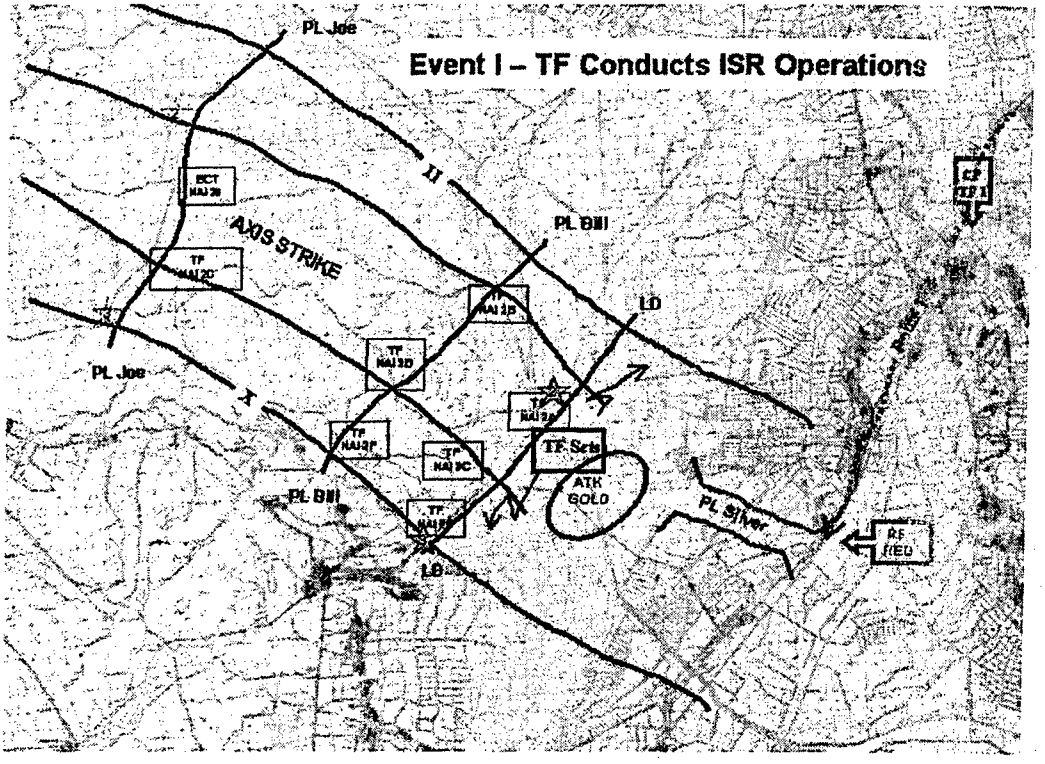
"Steps 4-8"

Steps 4-8 are performed for each critical event that the Cdr/XO decides to wargame.



War Game Exercise Specific Guidance

For this exercise, you are the **Task Force S2** (call sign **Regular 2).** Participants in the war game include the TF XO (Regular XO), the TF S3 (Regular 3), the TF S4 (Regular 4), the TF FSO (Regular 14), and the Threat Commander. The exchange of information throughout Steps 4-8 of the wargame process will be by radio, digital overlay, or text messaging (free text or chat). Since you are simulating wargaming in a distributed environment, face-to-face coordination is not possible. The Event to be war gamed is Event I – *TF conducts ISR Operations to Support the TF LD* (see graphic below)



The following table expands on Steps 4-8 of the wargame process. The table provides sequence for the wargame and specific TF S2 actions that you are expected to accomplish to control and contribute to the war game exercise. The guide provides you with the means to update the staff and incorporate your specific BOS into the wargame. In order to facilitate your participation this distributed process, it is recommended that you indicate when they are finished with your briefing/input.

War Game Step	Action	Activity
STEP 4a. Set the Stage.	Friendly Situation	Regular 3 briefs the Friendly Situation.
	Threat Situation	The Threat Commander briefs the Threat Situation.
Step 4b. TF Action	Intelligence	TF S2 briefs Intel Update for this event. First inform all to post the **Intel and Information Preparation of the Battlefield (IPB) overlays**. Then brief the following: ***"There is a high level of uncertainty concerning the threat.*** ▪ ***We can expect him to conduct distributed operations with squad-sized or smaller elements throughout our zone.*** ▪ ***The threat is composed of a mix of conventional, irregulars, and mercenaries forces fighting side by side.*** ▪ ***He is capable of small arms fire, augmented with RPGs and some larger caliber fire (such as 2x23mm and 2x57mm). His indirect fires support is primarily mortars.*** ▪ ***There is limited to no air threat. At best the threat is capable of small element helicopter operations. At largest platoon sized.*** ▪ ***There is no conventional threat from chemical, nuclear or bio weapons usage. Although if threat resorts to terrorist tactics, isolated incidents of chemical and bio weapons usage is possible.*** ▪ ***The COP depicts last known and expected threat locations. The red dashed circles designate the threats most likely ambush sites – main roadway intersections that offer nearby covered and concealed positions.*** ▪ ***There are no weather or terrain implications for this event.*** ▪ ***There are no key or decisive terrain implications for this event.***
Step 4b. TF Action	Maneuver	Regular 3 briefs Planning Assumptions Impacting this Event, the Maneuver BOS, and the Decision Points.
		Regular 3 will brief the engineer activities:
		Regular 14 briefs fire support.
		Regular 4 briefs logistical aspects of this event.
STEP 5 Reaction	Threat reaction to TF maneuver	Threat Commander briefs threat reaction to TF actions
STEP 6	Intelligence	**Regular 2** briefs how the enemy reaction impacts the intel BOS, recommends changes, or confirms the COA.

War Game Step	Action	Activity
Counter-reaction	Maneuver	Regular 3 briefs how to adjust its maneuver in response to the enemy's reaction, and confirms the COA or recommends changes to the COA.
	Fires	Regular 14 briefs fires response and confirms the COA or recommends changes to the COA.
	Combat Service Support (CSS)	Regular 4 briefs how logistics is affected.
STEP 7 Record results	Update the COA and sketch	Regular 5 verifies that the RECORDER has recorded the critical elements of the wargame and any decisions made for modifications or changes to the COA.
STEP 8 Complete wargame	Decision to continue or terminate Exercise 1 war game.	Regular 5, based on the discussion, will decide: • to re-run this event wargame and instruct the S3 to repeat the steps above, or, • to end this event's analysis, and instruct the RECORDER to summarize this event's results and go on to the next event's wargame and repeat the steps above. (Regular 3A summarizes this event wargame results.) If this is the last event, direct that the wargame is concluded, and d the following…

Appendix G

Sample Collaborative Solutions Rating Form:
Horizontal (Staff) Exercise

MODP Assessment: Collaborative Solutions to Problems Identified in Wargaming

Date: _____ BOS's not syncronized with maneuver plan...

	Problem:	Triggering Event:	Level of consideration given to BOS sync.: ID'd Problem	Group Discussed	Recorded Solution	scores	grades
Event 1	Intel: Need to deal with ambush sites. Maneuver: Need security away from urban area and local crowd control of routes. CSS: Need retrans or Fwd CP to control ISR operation at TF level.	< Ambushes at canal crossings. < Hostile locals interfere with passage lane checkpoints in urban area.				=	
Event 2	Intel: Need to ID crossing points on canals. Fire Spt: Need to support INTEL danger points (more developed FS plan). Mobility: Need to address canal crossing. CSS: Need to secure soft assets. CSS: Need fuel & repair before objective.	< Canals flooded by enemy. < Raids on rear area inside AO. < Long moves require fuel/repairs.				=	
Event 3	Fire Spt: Need a more developed fire support plan, especially with regards to smoke. Intel: Need element detailed to observe low ground behind objective to isolate it. Intel: Vulernable flanks endanger the forces trying to isolate the OBJ.	< Enemy can observe preparations for the assault and respond. < Dead space behind the objective allows enemy to avoid isolation. < Enemy in hide positions on flanks are capable of rear fires.				=	
Event 4	Intel: Need to ID decisive terrain for assault. Fire Spt: Need to conceal approach. Intel: Need maneuver to dislocate en strength. Mobility: Need to position mobility assets to assist assault/change assault lanes.	< Enemy blows bridge and executes complex ambush. < Assault goes into en strength. < Flooded canals inhibit easy assault into OBJ.				=	
Event 5	Intel: Need to contact local SOF force to gain intel on local centers of gravity (friend&en). Intel: Need an element dedicated to refugee camp control until higher can assume resp. CSS: Need immediate aid to refugee camp. CSS: Need to acquire materials.	< Various local contacts are made with offers and information. < Refugee camp is haven for anti-U.S. forces. < Multiple civilian casualties, as well as thirst and hunger. < Need to construct secure CPs.				=	

(instructions on back)

values from back: ____

cumulative score/grade: ____ / ____

Grading Scale:
2 = best solution arrived at
1 = adequate solution, but not the best
0 = not a viable solution

Percentage Assessment:	
no. of "0" scores:	____ of ____ = ____ %
no. of "1" scores:	____ of ____ = ____ %
no. of "2" scores:	____ of ____ = ____ %
no. of "3" scores:	____ of ____ = ____ %

27Jan 2004

Instructions for the completion of the MODP Assessment Worksheet

1 **General**. Worksheet is to be completed during the progress of a MODP exercise by the evaluator/observer. Each event assessment should be completed before moving on to the next event, in order that information is fresh in the mind of the evaluator. Assessment is based upon how the group handles BOS syncronization problems uncovered during the wargame.

2 **Level of Consideration Scoring**: Check each level of BOS problem consideration that was performed by the players as the event unfolds. Add up these checks to the right, indicating a 0, 1, 2, or 3, based upon:

0 = the problem was never brought up at the group level (by voice or text transmissions)
1 = problem was id'd/acknowledged by the group (more than the original member who had information).
2 = problem was discussed by more than one person in the group.
3 = group created a solution for the problem, recording it for modification of the COA event being wargamed.

3 **Cumulative Resolution Score**: Add up all the resolution scores, to include any unprogrammed scores from the back of the form, and place the sum in the box indicated.

4 **Unprogramed problems**: The group may spend time on problems not brought out specifically by the exercise materials. The group can still get credit for this work. Describe the problem using the table below, and transfer results to the front of the form:

Problem:	ID'd Problem	Group Discussed	Recorded Solution	score	grade
				=	
				=	
				=	
				=	

score/grade to transfer to front: ____ ____

5 **Problem Resolution GRADE**: Rate the *quality* of the solution the group arrived at with a "2" if it was the best solution, a "1" if it was a viable solution, or a "0" if it was clearly a solution that could not solve the problem. This is a subjective rating based upon the experience of the evaluator.

6 **Percentage Assessment**: Use this table to assess the percentage of problems that received a 0, 1, 2, or 3 level score.

Appendix H

Sample Post-Event Surveys: Horizontal (Staff) Exercise

Survey – Event I (ISR Operations before TF LD)
(please circle the one best answer that you agree with)

1. What level of enemy resistance did the S2 believe would be present in the Area of Operations at the beginning of the wargame?
   a. Armenian Regular Army forces would defend in place.
   b. Enemy conventional forces and paramilitary forces would withdraw, with only some resistance at the objective area.
   c. There would be no real resistance to our operation.

2. Which of the following is NOT a feature of terrain in our Area of Operations?
   a. Canals with berms which may impede mobility
   b. Dense forests which may hide enemy forces
   c. Villages/urban which may provide cover/concealment for enemy forces

3. How did the group decide to respond to the prospect of increased enemy resistance against our ISR operations?
   a. We added the mortar platoon to the scout platoon.
   b. We added the mortar platoon and some extra combat maneuver elements (more tank or IFV platoons).
   c. None of the above.

4. What types of fire support are available to the scout platoon in this phase of the operation?
   a. Field Artillery from our DS battalion.
   b. CAS from USAF.
   c. Neither of the above.

Survey – Event II (Move along AXIS STRIKE)
(please circle the one best answer that you agree with)

5. What was the threat to the TF's rear area once combat elements left the LD behind?
   a. We may have bypassed some BRDMs from the Armenian Army reconnaissance element left behind.
   b. We expect the Iranian Army to attack north across the border into our rear area.
   c. Paramilitary forces hiding in the towns might emerge behind our combat elements to attack our trains.

6. Where was the threat ambushing our scouts?
   a. In the villages.
   b. Crossing the canals.
   c. In the woods.

7. How did we handle all the canals we were projected to cross along AXIS STRIKE?
   a. We attached engineer assets to the lead element.
   b. We modified AXIS STRIKE to avoid some canals.
   c. We did neither of the above.

8. How far behind the scouts/forward security element was the main body intended to travel?
   a. One phase line.
   b. Two phase lines.
   c. Eight hours.

Survey – Event III (Isolating the Objective)
(please circle the one best answer that you agree with)

9. What element was tasked to observe the low ground behind the OBJ?
   a. Scout Platoon.
   b. One of the maneuver companies.
   c. None of the above.

10. How were we going to prevent enemy fire into our flanks from outside our boundaries as we neared the OBJ?
   a. Use of mortar smoke only.
   b. A unit was designated to overwatch the potential enemy fire positions on the flank, in addition to use of smoke.
   c. None of the above.

11. What unit is tasked to watch Birmay and any enemy advancing from that southern town towards the OBJ (from the southwest)?
   a. Scout Platoon.
   b. B Company.
   c. None of the above.

12. What does A Company do during this phase of the operation?
   a. Covers the front and fixes the enemy by fire.
   b. Moves to the north of the OBJ.
   c. Moves to support the Scout Platoon.

Survey – Event IV (Securing the Objective)
(please circle the one best answer that you agree with)

13. Where was the center of enemy resistance?
   a. The refugee camp.
   b. The police station.
   c. None of the above.

14. Where was enemy mortar fire coming from?
   a. The police station.
   b. The town of Birmay.
   c. None of the above.

15. Who was tasked to contact the local Special Operations Force team in town?
   a. Scout Platoon.
   b. One of the maneuver teams.
   c. None of the above.

16. What was the greatest threat to the CSS elements along our line of contact (LOC) in our area of operations (AO)?
   a. Enemy mortar fire.
   b. Enemy paramilitary raids.
   c. Friendly fire.

Survey – Event V (Stability Operations)
(please circle the one best answer that you agree with)

17. What was the expected reaction of locals to U.S. securing of the objective?
    a. They welcome U.S. forces.
    b. They are hostile to U.S. forces.
    c. They are a mixed group of friendlies and hostiles.

18. Was there a local leader friendly or hostile to U.S. interests?
    a. He was friendly to our interests.
    b. He was hostile to our interests.
    c. There was no local leader in the wargame.

19. Who was tasked to provide immediate assistance to the refugee camp?
    a. The S4 and trains were specifically tasked.
    b. Company B was specifically tasked.
    c. None of the above was tasked.

20. Whose responsibility was it to secure/monitor traffic coming across the bridge from Birmay?
    a. Scout Platoon's.
    b. Company B's.
    c. None of the above.

Appendix I

Final Survey:
Horizontal (Staff) and Vertical (Command) Exercises

Final Survey

1. The Read-ahead materials helped prepare me for the exercise.
   _____True
   _____False
   _____I did not read the material.

2. The morning Training Session adequately prepared me to complete the exercise.
   _____True
   _____False
   Explain: _____

3. The Certification Drill at the beginning was very helpful for using the workstation.
   _____True
   _____False
   Explain: _____

4. I was able to use the workstation to access overlays and other information I needed to complete the exercise in a timely manner.
   _____True
   _____False
   Explain: _____

5. The background materials provided were sufficient for completing the exercise.
   _____True
   _____False
   Explain: _____

6. This method of wargaming could be used in actual operation (NTC, warfare, etc.)
   _____True
   _____False
   Explain: _____

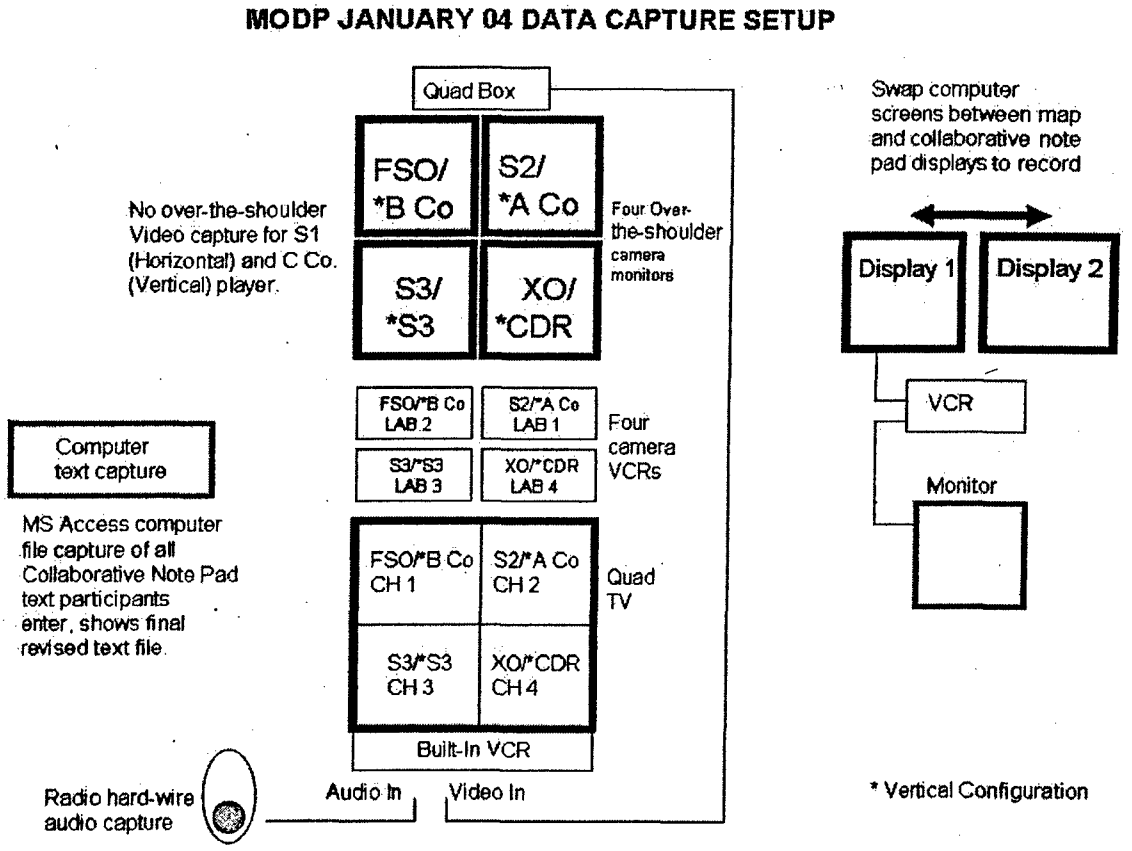
7. The tool we could have really used to make this wargaming process more effective is
   _____
   _____

8. What I think worked best about this wargaming process is _____
   _____
   _____

9. What I would change in this wargaming process is _____

Appendix J

Mini-lab Set Up for Electronic Data Recordings



Appendix K

Summary of Non-Contingent Observer Ratings of BOS Synchronization
by Exercise and Event

Horizontal (Staff)

		Observer ratings of BOS synchronization		
		Problem Identified	Problem Discussed	Problem Resolved
Event 1				
Event 1	Rater1	4/4 (100%)	4/4 (100%)	4/4 (100%)
	Rater2	4/4 (100%)	4/4 (100%)	4/4 (100%)
Event 4	Rater1	6/8 (75%)	6/8 (75%)	6/8 (75%)
	Rater2	6/8 (75%)	6/8 (75%)	3/8 (38%)
Event 5	Rater1	1/5 (20%)	1/5 (20%)	1/5 (20%)
	Rater2	1/5 (20%)	1/5 (20%)	1/5 (20%)
Combined	**Rater1**	**11/17 (65%)**	**11/17 (65%)**	**11/17 (65%)**
	Rater2	**11/17 (65%)**	**11/17 (65%)**	**8/17 (47%)**
Exercise 2				
Event 1	Rater1	2/4 (50%)	1/4 (25%)	1/4 (25%)
	Rater2	2/4 (50%)	1/4 (25%)	1/4 (25%)
Event 2	Rater1	5/5 (100%)	5/5 (100%)	3/5 (60%)
	Rater2	5/5 (100%)	3/5 (60%)	2/5 (40%)
Event 5	Rater1	3/5 (60%)	2/5 (40%)	1/5 (20%)
	Rater2	5/5 (100%)	5/5 (100%)	3/5 (60%)
Combined	**Rater1**	**10/14 (71%)**	**8/14 (57%)**	**5/14 (36%)**
	Rater2	**12/14 (86%)**	**9/14 (64%)**	**6/14 (43%)**

Vertical (Command)

Exercise 3				
Event 1	Rater1	2/3 (67%)	2/3 (67%)	2/3 (67%)
	Rater2	2/3 (67%)	2/3 (67%)	*
Event 2	Rater1	4/5 (80%)	4/5 (80%)	4/5 (80%)
	Rater2	4/5 (80%)	4/5 (80%)	*
Event 4	Rater1	2/4 (50%)	2/4 (50%)	2/4 (50%)
	Rater2	1/4 (25%)	1/4 (25%)	*
Combined	**Rater1**	**8/12 (67%)**	**8/12 (67%)**	**8/12 (67%)**
	Rater2	**7/12 (58%)**	**7/12 (58%)**	*
Exercise 4				
Event 1	Rater1	3/3 (100%)	3/3 (100%)	3/3 (100%)
	Rater2	3/3 (100%)	3/3 (100%)	3/3 (100%)
Event 4	Rater1	3/4 (75%)	3/4 (75%)	2/4 (50%)
	Rater2	2/4 (50%)	2/4 (50%)	2/4 (50%)
Combined	**Rater1**	**6/7 (86%)**	**6/7 (86%)**	**5/7 (71%)**
	Rater2	**5/7 (71%)**	**5/7 (71%)**	**5/7 (71%)**

*Data were not available for this event.

Appendix L

Final Survey Results by Exercise Session

Final Survey Results for Horizontal (Staff) Exercise:
Exercise Session 1

Item	Responses
1. The Read-ahead materials helped me prepare for the exercise.	5 True
2. The morning training session adequately prepared me to complete the exercise. - Ran through the scenario to give me a better understanding. - I was able to effectively use the tools.	5 True
3. The certification drill at the beginning was very helpful for using the workstation. - It taught the basics to successfully navigate the scenario. - Afterwards I was able to do everything with minimal problems.	5 True
4. I was able to use the workstation to access overlays and other information I needed to complete the exercise in a timely manner.	5 True
5. The background materials provided were sufficient for completing the exercise. - They were very helpful with keeping us on track.	5 True
6. This method of war gaming could be used in actual operation (NTC, warfare, etc.) - Needs some upgrades, needs staff practice. - It has technological limitations, though it is very effective. - It will be useful, but being on the ground will uncover potential hazards.	5 True

7. The tool we could have really used to make this war gaming more effective is: - Having the ability to send and review files. - Digital sends on info from other staff sections; a lot of info to digest over the radio. - The scripts could have been more detailed for actions in maneuver. - PVD conference. - A little more time to get familiar with the computer.
8. What I think worked best about this war gaming process is: - Use of the chat tool allowed us to capture changes, issues and RFIs to the COA. - Closed environment to focus staff work. - The fact that it is distributed. This forces everyone to stay disciplined. - Documented, info sharing on the chat feature. - Quick to the point briefings from all staff members.
9. What I would change in this war gaming process is: - Possibly have the group do the process using only the chat tool. - Process needs practice by the staff to be effective. - More use of PVD to share concepts and updates during the process. - Time per event. Fewer events or more time per event. - More threat actions for us to develop COAs.

Note: Number of participants per session = 5.

Final Survey Results for Horizontal (Staff) Exercise:
Exercise Session 2

Item	Responses
1. The Read-ahead materials helped me prepare for the exercise - Caught on quickly with briefing. Gave me everything I needed to know (comment from participant who did not read materials.)	4 True 1 Did not read
2. The morning training session adequately prepared me to complete the exercise. - Could have used more hands on time.	5 True
3. The certification drill at the beginning was very helpful for using the workstation. - A bit too segmented; computer crashed.	5 True
4. I was able to use the workstation to access overlays and other information I needed to complete the exercise in a timely manner. - System crashes, flickering screen, non user friendly portion. - Overlays are easy to access. - The assistant was invaluable in aiding this.	4 True 1 False
5. The background materials provided were sufficient for completing the exercise. - Not sure I used any background materials. - Not nearly deep enough.	3 True 2 False
6. This method of wargaming could be used in actual operation (NTC, warfare, etc.) - But could be painful. Commo must work. One key to war game is group focus on same map, matrix, etc., and no assurance of this in this medium. - I wouldn't use this version...needs to be improved. - Not with current software.	4 True 1 False

7. The tool we could have really used to make this wargaming more effective is: - Someone dedicated to record recommendations. - None. - Maneuver Support (MS) Net Meeting...much better application. Force XXI Battle Command Brigade and Below (FBCB2) – all the icons are correct. - Ability to animate during COA description to help visualize the operation. - A way to communicate with one individual "on the side."
8. What I think worked best about this war gaming process is: - The record in the chat room. - An external threat commander – not the S2. - The script. - Everyone has a computer and can add notes simultaneously. - Easy to read overlays, chat tool.

Final Survey Results for Horizontal (Staff) Exercise (continued):
Exercise Session 2

Item
9. What I would change in this wargaming process is: - Would be easier to read staff updates than hear them over the radio, and then ask questions and/or provide comments. One radio net limits side comments/discussions that limit contributions to wargaming. - Nothing. - Have 15" x 15" digital whiteboards that every collaborator had so we could share sketches quickly…until that happens, the manual wargaming is more effective and less timely. Map application needs a lot of work…see my tech's comments. - Expand the program so that true collaboration is possible – less technical friction. - Have staff close enough together to be able to talk face-to-face if desired (don't have to be in same room.).

Note: Number of participants per session = 5.

Final Survey Results for Vertical (Command) Exercise:
Exercise Session 3

Item	Responses
1. The Read-ahead materials helped me prepare for the exercise.	4 True 1 False
2. The morning training session adequately prepared me to complete the exercise. - A lot of information in a short period of time. - More training on the software may have allowed me to focus on MDMP data as opposed to figuring out computer software.	4 True 1 False
3. The certification drill at the beginning was very helpful for using the workstation. - Was well explained.	5 True
4. I was able to use the workstation to access overlays and other information I needed to complete the exercise in a timely manner.	5 True
5. The background materials provided were sufficient for completing the exercise. - Took the initial event to get used to it.	5 True
6. This method of wargaming could be used in actual operation (NTC, warfare, etc.) - Has possibilities. - I think we would have to have a lot of training to get anything out of this method of war gaming. - Commander input in wargaming is important.	4 True 1 False

7. The tool we could have really used to make this wargaming more effective is: - Adequate tools, just takes time getting used to them. - Somehow be able see the graphics in better detail without over cluttering everything. - None. - Pucksters to help draw in graphic control measures.
8. What I think worked best about this wargaming process is: - Counter/action discussion process. Opportunity for input from all players. - Speed. - Collaborative notepad was very useful. - The information flow from the Battalion CDR to the Company CDRs. - The collaborative notepad.
9. What I would change in this wargaming process is: - More initial practice, though event #1 did this. - Make maneuver graphics animated as commanders brief their scheme. - Graphics software. - Nothing. - Ability to change graphics/easier method.

Note: Number of participants per session = 5.

Final Survey Results for Vertical (Command) Exercise:
Exercise Session 4

Item	Responses
1. The Read-ahead materials helped me prepare for the exercise.	5 True
2. The morning training session adequately prepared me to complete the exercise. - For the most part. It's tough to fight a computer system you are not familiar with, but we managed.	5 True
3. The certification drill at the beginning was very helpful for using the workstation. - Slightly confusing – helped on hindsight but initially confusing. - Need more time to understand how the system works. - Helped the issue of #2. - Helped me find the correct buttons.	5 True
4. I was able to use the workstation to access overlays and other information I needed to complete the exercise in a timely manner. - Need to work off one overlay, it got too confusing on which overlay someone was updating.	4 True 1 False
5. The background materials provided were sufficient for completing the exercise.	5 True
6. This method of wargaming could be used in actual operation (NTC, warfare, etc.) - I think the unit needs the ability to make changes versus everything being written out for them. - But somehow slow process; precise graphics may be difficult to draw. - Could be…but not unpracticed. As a Command (CMD) Group, it may be best used for rehearsal, not wargame. As a staff, maybe.	4 True 1 False

7. The tool we could have really used to make this war gaming more effective is: - All computers operations – I like the Common Operational Picture (COP) feature - Better understanding of how the workstation works. - Contour lines? - A hard copy map for reference. - Message boards.
8. What I think worked best about this wargaming process is: - COP. - Cross talk among the Soldiers and civilians in the building. - Real-time graphic updates. - The 1 hr. prep before we began. Brief on the situation and computer practice. Wargame itself = CDR's ability to re-do graphics and show the group on-line. - Commo.

Final Survey Results for Vertical (Command) Exercise (continued):
Exercise Session 4

Item
9. What I would change in this wargaming process is: - Better graphics maps – a way to declutter and still show the required information. - Allow the units the ability to go through the entire wargaming process. - Add times to message board; add message alerts. - Force a time line for each turn. It can get out of hand with mission plan changes. - Nothing.

Note: Number of participants per session = 5.

Appendix M

Read-Me File

MULTI-ECHELON OPERATIONS FOR DISTRIBUTED PLANNING (MODP):
A Wargaming Example

This CD contains distributed wargaming materials for the Current and Future Force from MODP. For the Current Force, the CD contains a complete set of distributed wargaming materials, as described below. For the Future Force, however, the CD contains an incomplete but useful starter set of distributed wargaming materials, as described below.

1. MODP READ AHEAD MATERIAL. The MODP Read Ahead material provides an overview of distributed wargaming concepts and training methodology relevant to both the Current Force and Future Force exercises.

2. MULTI-ECHELON OPERATIONS FOR DISTRIBUTED PLANNING FOLDER

a. CURRENT FORCE EXERCISES. The Current Force exercises (commanders and staff) each include a total of five events and their corresponding evaluation materials. The Current Force Commanders exercise is designed for the following participants:

- TF Cdr
- TF S3
- Tm A Cdr
- Tm B Cdr
- Co C Cdr
- Threat Cdr

The Current Force Staff exercise is designed for the following participants:

- TF XO
- TF S3
- TF S1 & S4
- TF S2
- TF FSO
- Threat Cdr

b. FUTURE FORCE EXERCISES. The Future Force exercises were designed to incorporate the task organizations and operational concepts presented in Objective Force White Paper and Chapters 3 and 4 of Chg 2 to TRADOC Pamphlet 525-3-90 O&O Objective Force Operational & Organizational Plan for UA (30 June 2003). The operational scenario is based on UA vignettes from Annex F of Chg 2 to TRADOC Pamphlet 525-3-90 O&O Objective Force Operational & Organizational Plan for UA (30 June 2003). The exercises strive to train commanders and staff as they are expected to operate in actual MDMPs – reinforcing commander and staff skills required to plan, analyze and make decisions concerning operations at the brigade and lower levels (UA and combined arms battalion [CAB]) in the Objective Force.

The exercises address the key tactical concepts of "See First, Act First, Understand First, and Finish Decisively." These concepts lead Future forces to conduct operations characterized by developing situations out of contact; maneuvering to positions of advantage; engaging enemy forces beyond the range of their weapons; destroying them with precision fires and, when necessary, by tactical assault at times and places of their choosing.

The Future Force exercises are designed around a Combined Arms Battalion (CAB). The battalion includes a Reconnaissance Troop, a Non-Line of Sight (NLOS) Mortar Battery, two Mounted Combat System (MCS) Companies, and two Infantry Companies. The model for the battalion staff addresses integrated Battlefield Operating Systems cells instead of staff sections led by key staff officers. The staff cells include an Information Superiority Cell, a Maneuver and Support Cell, a Fires and Effects Cell, and a Build Combat Power Cell.

For the Future Force exercises (commanders and staff) only the materials for the first event in the scenario were developed. The assessment worksheet and surveys are partially developed and limit their focus to the one event developed for the exercise. The one event developed for the Future Force Commanders exercise is designed for the following participants:

- CAB Cdr
- CAB Maneuver & Support Officer
- Recon Troop Cdr
- Two Infantry Co Cdrs
- Threat Cdr

The one event developed for the Future Force Staff exercise is designed for the following participants:

- CAB XO
- CAB Build Combat Power Officer
- CAB Information Superiority Officer
- CAB Maneuver and Support Officer
- CAB Fires and Effects Officer
- Threat Cdr

c. TRAINING MATERIALS. Training materials are provided to support both the Current Force and Future Force participants as outlined in the table below.

Materials for Distributed Wargaming Exercise	Current Force - Commanders	Current Force - Staff	Future Force - Commanders	Future Force – Staff
Preparation Brief	Complete	Complete	Complete	Complete
Training Brief	Complete	Complete	Complete	Complete
Event I Execution Guide	Complete	Complete	Complete	Complete
Event II Execution Guide	Complete	Complete	Not Developed	Not Developed
Event III Execution Guide	Complete	Complete	Not Developed	Not Developed
Event IV Execution Guide	Complete	Complete	Not Developed	Not Developed
Event V Execution Guide	Complete	Complete	Not Developed	Not Developed
Assessment Worksheets	Complete	Complete	Partial*	Partial*
Participant Surveys	Complete	Complete	Partial*	Partial*

*The assessment worksheet and surveys are partially developed and limit their focus to the one event developed for the exercise.

3. CURRENT FORCE - COMMANDERS EXERCISE FOLDER: This folder contains the execution guides for the five events contained in this exercise. Each event will have an execution guide for the following participants:

- TF Cdr
- TF S3
- Tm A Cdr
- Tm B Cdr
- Co C Cdr
- Threat Cdr

4. CURRENT FORCE - STAFF EXERCISE FOLDER: This folder contains the execution guides for the five events contained in this exercise. Each event will have an execution guide for the following participants:

- TF XO
- TF S1 & S4
- TF S2
- TF S3
- TF FSO
- Threat Cdr

5. CURRENT FORCE - SUPPORT MATERIALS FOLDER: This folder contains the support materials used in preparing for and assessing execution of the Current Force Commanders and Staff exercises.

a. OVERVIEW & PREP BRIEFINGS FOLDER: The Readahead.ppt file is used to provide participants an overview of distributed wargaming and the MODP exercises. The Commanders Day.ppt and Staff Day.ppt files are used to in brief participants prior to execution of an exercise.

b. PARTICIPANT TRAINING & JOB AIDS FOLDER: This folder contains training materials and job aids to assist participants in becoming familiar with the operation of the voice communications, Tactical Internet - web browser, Collaborative Notepad - web browser, and SC4-Command and Control System.

c. EXERCISE ASSESSMENT FOLDER: This folder contains the materials used to assess participant actions during execution of the MODP exercises. The MODP Assessment System.doc file explains the worksheets and survey used in exercise assessment. Copies of the Assessment Worksheets for the Commanders and Staff exercise, MODP Survey Scoring, and Worksheet Tactical Tips are included as well.

6. FUTURE FORCE - COMMANDERS EXERCISE FOLDER: This folder contains the execution guides for the first event provided for this exercise. Execution guides are provided for the following participants:

- CAB Cdr
- CAB Maneuver & Support Officer

- Recon Troop Cdr
- Co C Cdr
- Co D Cdr
- Threat Cdr

7. FUTURE FORCE - STAFF EXERCISE FOLDER: This folder contains the execution guides for the one event developed in this exercise. Execution guides are provided for the following participants:

- CAB XO
- CAB Build Combat Power Officer
- CAB Information Superiority Officer
- CAB Maneuver & Support Officer
- CAB Fires & Effects Officer
- Threat Cdr

8. FUTURE FORCE - SUPPORT MATERIALS FOLDER: This folder contains the support materials used in preparing for and assessing execution of the Future Force Commanders and Staff exercises.

a. OVERVIEW & PREP BRIEFINGS FOLDER: The Readahead.ppt file is used to provide participants on overview of distributed wargaming and the MODP exercises. The Commanders Day.ppt and Staff Day.ppt files are used to in brief participants prior to execution of an exercise.

b. PARTICIPANT TRAINING & JOB AIDS FOLDER: This folder contains training materials and job aids to assist participants in becoming familiar with the operation of the voice communications, Tactical Internet - web browser, Collaborative Notepad - web browser, and SC4-Command and Control System.

c. EXERCISE ASSESSMENT FOLDER: This folder contains the materials used to assess participant actions during execution of the MODP exercises. The MODP Assessment System.doc file explains the worksheets and survey used in exercise assessment. Copies of the Assessment Worksheets for the Commanders and Staff exercise, MODP Survey Scoring, and Worksheet Tactical Tips are included as well.